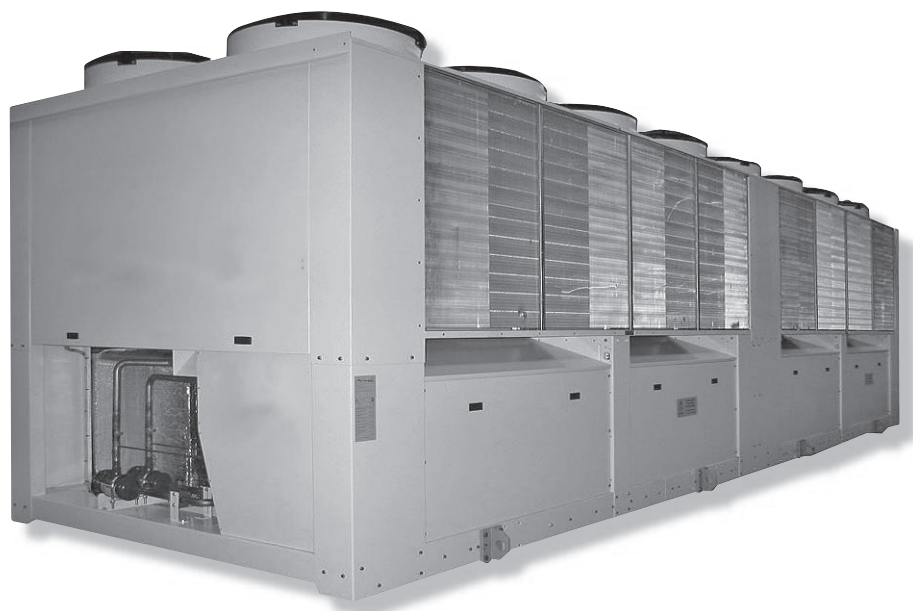


SLS 1202 ÷ 4004

SLH 1202 ÷ 3804



English



262
↓
916 kW



287
↓
853 kW



Air cooled chillers and heat pumps with screw compressors

IOM SLS407-N.2GB

Date : July 2007

Supersedes : IOM SLS407-N.1GB/11.05



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1 FOREWORD

1.1 Introduction

Itelco-Industry units, manufactured to state-of-the-art design and implementation standards, ensure top performance, reliability and fitness to any type of air-conditioning systems. These units are designed for cooling water or glycoled water (and for water heating in heat pump models) and are unfit for any purposes other than those specified in this manual.

This manual includes all the information required for a proper installation of the units, as well as the relevant operating and maintenance instructions. It is therefore recommended to read this manual carefully before installation or any operation on the machine.

The chiller installation and maintenance must be carried out by skilled personnel only (where possible, by one of Itelco-Industry's Authorised Service Centers).

The manufacturer may not be held liable for any damage to people or property caused by improper installation, start-up and/or improper use of the unit and/or failure to implement the procedures and instructions included in this manual.

1.2 Warranty

These units are delivered complete, tested and ready for being operated. Any form of warranty will become null and void in the event that the appliance is modified without Itelco-Industry's preliminary written authorisation.

This warranty shall apply providing that the installation instructions have been complied with (either issued by Itelco-Industry, or deriving from the current practice), and the Form 1 ("Start-up") has been filled-in and mailed to Itelco-Industry (attn. After-Sales Service).

In order for this warranty to be valid, the following conditions shall be met:

- The machine must be operated only by skilled personnel from Itelco-Industry's Authorised After-Sales Service.
- Maintenance must be performed only by skilled personnel - from one of Itelco-Industry's Authorised After-Sales Centers.
- Use only original Itelco-Industry spare parts.
- Carry out all the planned maintenance provided for by this manual in a timely and proper way.

Failure to comply with any of these conditions will automatically void the warranty.

1.3 Emergency stop / Normal stop

The emergency stop of the unit can be enabled using the master switch on the control panel (move down the lever).

For a normal stop, press the relevant push-buttons.

To restart the appliance, follow the procedure detailed in this manual.

1.4 An introduction to the manual

For safety reasons, it is imperative to follow the instructions given in this manual. In case of any damage caused by non-compliance with these instructions, the warranty will immediately become null and void.

Conventions used throughout the manual:



The Danger sign recalls your attention to a certain procedure or practice which, if not followed, may result in serious damage to people and property.



The Warning sign precedes those procedures that, if not followed, may result in serious damage to the appliance.



The Notes contain important observations.



The Useful Tips provide valuable information that optimises the efficiency of the appliance.

This manual and its contents, as well as the documentation which accompanies the unit, are and remain the property of Itelco-Industry, which reserves any and all rights thereon. This manual may not be copied, in whole or in part, without Itelco-Industry's written authorization.

2 SAFETY

2.1 Foreword

These units must be installed in conformity with the provisions of Machinery Directive 98/37/EC, Low Voltage Directive 73/23/EC, Pressure Vessels Directive 97/23/EC, Electromagnetic Interference Directive 89/336/EC, as well as with other regulations applicable in the country of installation. If these provisions are not complied with, the unit must not be operated.



The unit must be grounded, and no installation and/or maintenance operations may be carried out before deenergising the electrical panel of the unit.

Failure to respect the safety measures mentioned above may result in electrocution hazard and fire in the presence of any short-circuits.



Inside the heat exchangers, the compressors and the refrigeration lines, this unit contains liquid and gaseous refrigerant under pressure. The release of this refrigerant may be dangerous and cause injuries.



The units are not designed to be operated with natural refrigerants, such as hydrocarbons. Itelco-Industry may not be held liable for any problems deriving from the replacement of original refrigerant or the introduction of hydrocarbons.

Itelco-Industry units are designed and manufactured according to the requirements of European Standard PED 97/23/EC (pressure vessels).

- The used refrigerants are included in group II (non-hazardous fluids).
- The maximum working pressure values are mentioned on the unit's data plate.
- Suitable safety devices (pressure switches and safety valves) have been provided, to prevent any anomalous overpressure inside the plant.
- The vents of the safety valves are positioned and oriented in such a way as to reduce the risk of contact with the operator, in the event that the valve is operated. Anyway, the installer will convey the discharge of the valves far from the unit.
- Dedicated guards (removable panels with tools) and danger signs indicate the presence of hot pipes or components (high surface temperature).



The guards of the fans (only for units provided with air heat exchangers) must be always mounted and must never be removed before de-energising the appliance.



It is the User's responsibility to ensure that the unit is fit for the conditions of intended use and that both installation and maintenance are carried out by experienced personnel, capable of respecting all the recommendations provided by this manual. It is important that the unit is adequately supported, as detailed in this manual. Non-compliance with these recommendations may create hazardous situations for the personnel.



The unit must rest on a base which meets the characteristics specified in this manual; a base with inadequate characteristics is likely to become a source of serious injury to the personnel.



The unit has not been design to withstand loads and/or stress that may be transmitted by adjacent units, piping and/or structures. Each external load or stress transmitted to the unit may break or cause breakdowns in the unit's structure, as well as serious dangers to people. In these cases, any form of warranty will automatically become null and void.



The packaging material must not be disposed of in the surrounding environment or burnt.

2.2 Definitions

OWNER: means the legal representative of the company, body or individual who owns the plant where Itelco-Industry unit has been installed; he/she has the responsibility of making sure that all the safety regulations specified in this manual are complied with, along with the national laws in force.

INSTALLER: means the legal representative of the company who has been given by the owner the job of positioning and performing the hydraulic, electric and other connections of Itelco-Industry unit to the plant: he/she is responsible for handling and properly installing the appliance, as specified in this manual and according to the national regulations in force.

OPERATOR: means a person authorised by the owner to do on Itelco-Industry unit all the regulation and control operations expressly described in this manual, that must be strictly complied with, without exceeding the scope of the tasks entrusted to him.

ENGINEER: means a person authorised directly by Itelco-Industry or, in all EC countries, excluding Italy, under his full responsibility, by the distributor of Itelco-Industry product, to perform any routine and extraordinary maintenance operations, as well as any regulation, control, servicing operations and the replacement of pieces, as may be necessary during the life of the unit.

2.3 Access to the unit

The unit must be placed in an area which can be accessed also by OPERATORS and ENGINEERS; otherwise the unit must be surrounded by a fence at not less than 2 meters from the external surface of the machine.

OPERATORS and ENGINEERS must enter the fenced area only after wearing suitable clothing (safety shoes, gloves, helmet etc.). The INSTALLER personnel or any other visitor must always be accompanied by an OPERATOR.

For no reason shall any unauthorised personnel be left alone in contact with the unit.

2.4 General precautions

The OPERATOR must simply use the controls of the unit; he must not open any panel, other than the one providing access to the control module.

The INSTALLER must simply work on the connections between plant and machine; he must not open any panels of the machine and he must not enable any control.

When you approach or work on the unit, follow the precautions listed below:

- do not wear loose clothing or jewellery or any other accessory that may be caught in moving parts
- wear suitable personal protective equipment (gloves, goggles etc.) when you have to work in the presence of free flames (welding operations) or with compressed air
- if the unit is placed in a closed room, wear ear protection devices
- cut off connecting pipes, drain them in order to balance the pressure to the atmospheric value before disconnecting them, disassemble connections, filters, joints or other line items
- do not use your hands to check for any pressure drops
- use tools in a good state of repair; be sure to have understood the instructions before using them
- be sure to have removed all tools, electrical cables and any other objects before closing and starting the unit again

2.5 Precautions against residual risks

Prevention of residual risks caused by the control system

- be sure to have perfectly understood the operating instructions before carrying out any operation on the control panel
- when you have to work on the control panel, keep always the operating instructions within reach
- start the unit only after you have checked its perfect connection to the plant
- promptly inform the ENGINEER about any alarm involving the unit
- do not reset manual restoration alarms unless you have identified and removed their cause

Prevention of residual mechanical risks

- install the unit according to the instructions provided in this manual
- carry out all the periodical maintenance operations prescribed by this manual
- wear a protective helmet before accessing the interior of the unit
- before opening any panelling of the machine, make sure that it is secured to it by hinges
- do not touch air condensation coils without wearing protective gloves
- do not remove the guards from moving elements while the unit is running
- check the correct position of the moving elements' guards before restarting the unit

Prevention of residual electrical risks

- connect the unit to the mains according to the instructions provided in this manual
- periodically carry out all the maintenance operations specified by this manual
- disconnect the unit from the mains by the external disconnecting switch before opening the electrical board
- check the proper grounding of the unit before start-up
- check all the electrical connections, the connecting cables, and in particular the insulation; replace worn or damaged cables
- periodically check the board's internal wiring
- do not use cables having an inadequate section or flying connections, even for limited periods of time or in an emergency

Safety

Prevention of other residual risks

- make sure that the connections to the unit conform to the instructions provided in this manual and on the unit's panelling
- if you have to disassemble a piece, make sure that it has been properly mounted again before restarting the unit
- do not touch the delivery pipes from the compressor, the compressor and any other piping or component inside the machine before wearing protective gloves
- keep a fire extinguisher for electrical appliances near the machine
- on the units installed indoor, connect the safety valve of the refrigeration circuit to a piping network that can channel any overflowing refrigerant outside
- remove and leak of fluid inside and outside the unit
- collect the waste liquids and dry any oil spillage
- periodically clean the compressor compartment, to remove any fouling
- do not store flammable liquids near the unit
- do not disperse the refrigerant and the lubricating oil into the environment
- weld only empty pipes; do not approach flames or other sources of heat to refrigerant pipes
- do not bend/hit pipes containing fluids under pressure

2.6 Precautions during maintenance operations

Maintenance operations can be carried out by authorised technicians only.

Before performing any maintenance operations:

- disconnect the unit from the mains with the external disconnecting switch
- place a warning sign "do not turn on - maintenance in progress" on the external disconnecting switch
- make sure that on-off remote controls are inhibited
- wear suitable personal protective equipment (helmet, safety gloves, goggles and shoes etc.)

To carry out any measurements or checks which require the activation of the machine:

- work with the electrical board open only for the necessary time

- close the electrical board as soon as the measurement or check has been completed
- for outdoor units, do not carry out any operations in the presence of dangerous climatic conditions (rain, snow, mist etc.)

The following precautions must be always adopted:

- do not scatter the fluids of the refrigeration circuit in the surrounding environment
- when replacing an eprom or electronic cards, use always suitable devices (extractor, antistatic bracelet, etc.)
- to replace a compressor, the evaporator, the condensing coils or any other weighty element, make sure that the lifting equipment is consistent with the weight to be lifted
- in air units with independent compressor compartment, do not access the fan compartment unless you have disconnected the machine by the disconnecting switch on the board and you have placed a warning sign "do not turn on - maintenance in progress"
- contact Itelco-Industry for any modifications to the refrigeration, hydraulic or wiring diagram of the unit, as well as to its control logics
- contact Itelco-Industry if it is necessary to perform very difficult disassembly and assembly operations
- use only original spare parts purchased directly from Itelco-Industry or the official retailers of the companies on the recommended spare parts list
- contact Itelco-Industry if it is necessary to handle the unit one year after its positioning on site or if you wish to dismantle it.

2.7 Safety labels

The labels below will be affixed to each unit in the indicated point:



Identification of the refrigerant - External door

COD. PRODOTTO NEUTRO PRODUCT CODE	<input type="text"/>
MODELLO MODEL	<input type="text"/>
CE	
OdL	<input type="text"/>
MATRICOLA SERIAL NUMBER	<input type="text"/>
ANNO DI COSTRUZIONE	<input type="text"/>
CARICA REFR. REFRIGERANT CHARGE CHARGE	CIRCUITO 1 2 3 4 Kg <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
ALTA PRESSIONE HIGH PRESSURE	(max) bar <input type="text"/>
BASSA PRESSIONE LOW PRESSURE	(max) bar <input type="text"/>
ALIM. POTENZA MAIN SUPPLY	V/PH/Hz <input type="text"/> <input type="text"/> <input type="text"/>
CORRENTE DI SPUNTO LRA	(max) A <input type="text"/>
CORRENTE A PIENO CARICO	(max) A <input type="text"/>
POTENZA ASSORBITA POWER INPUT	(max) Kw <input type="text"/>
PRESS. ESERC. ACQUA WATER OPERATION PRESSURE	(max) bar <input type="text"/>
MASSA MASS	(max) Kg <input type="text"/>
ITELCO-INDUSTRY S.r.l. Via XXV Aprile 29 20030 BARLASSINA MI (ITALIA) MADE IN ITALY	

Identification of the unit - Outside, on the right-hand front column

TENERE SU QUESTA LINEA
GANCIO DI SOLLEVAMENTO

KEEP LIFT HOOK
ON THIS LINE

Gravity centre - Base



Electrical warning
Adjacent to the master switch

ATTENZIONE

INSERIRE LE RESISTENZE DI RISCALDAMENTO OLIO ALMENO 12 ORE PRIMA DI OGNI AVVIAMENTO (SE PREVISTE).

PRIMA DELLA MESSA IN TENSIONE ASSICURARSI CHE LE VITI DEI CIRCUITI ELETTRICI SIANO SERRATE COMPLETAMENTE.

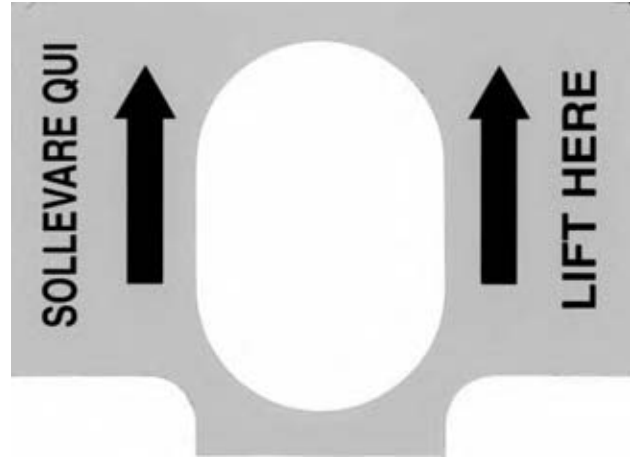
WARNING

ENERGIZE THE CRANCKCASE HEATER FOR AT LEAST 12 HOURS BEFORE EACH STARTING (IF FITTED).

BEFORE TIGHTENING-UP, TO TIGHTEN ALL TERMINAL SCREWS ESPECIALLY THOSE IN MAIN CIRCUIT.

881000215/0

Start-up warning - Outside the door of the electrical board



Lifting point - Base

CERTIFICATO DI COLLAUDO PRODUZIONE ITELCO-CLIMA
ITELCO-CLIMA PRODUCTION TEST CERTIFICATE
UNITA' ARIA-ARIA/ARIA-ACQUA - SEMICENTRALI - CHILLER AIR/AIR AIR/WATER

PROGR. COLL. NUMBER CHECK	DESCRIZIONE DEI TEST DESCRIPTION OF QUALITY CHECK	TIMERO OPERAT. INSP. CODE
01	VERIFICA ASSEMBLAGGIO VERIFY ASSEMBLY COMPLETE	
02	VERIFICA VISIVA CABLAGGIO COLLEG. ELETTRICI E CONNESSIONE VERIFY WIRING CONNECTIONS	
03	VUOTO E CARICA REF. VACUUM AND CHARGE TEST	
04	VERIFICA CON CERCAFUGHE TENUTA CIRCUITO FRIGORIFERO REFRIGERANT LEAK TEST	
05	PROVE FUNZIONALI CON RILIEVI TEMPERATURE/PRESSIONI-RUMORE FUNCTION AND RUN TEST NOISE TEST	
06	VERIFICA INTERVENTI SICUREZZE PRESSIONE E TEMPERATURA CHECK OPERATION AND SAFETY DEVICES	
07	VERIFICA TENUTA CIRCUITO IDR. E FUNZIONAMENTO POMPA (SU PACK) HYDRAULIC CIRCUIT TEST (PUMP CHECK ONLY FOR PACK UNIT)	
08	VERIFICA MONTAGGIO ACCESSORI (SE PREVISTI) E DOCUMENTAZIONE CHECK ACCESSORIES/DOCUMENTATION	
09	CONTROLLO ESTETICO FINALE E PULIZIA INTERNA VISUAL CHECK FOR DIRT AND DAMAGE	

Final Test Certificate - Inside the external door

EIN - INLET
ENTRÉE - ENTRATA
AUS - OUTLET
SORTIE - USCITA

Fitting identification - Adjacent to fittings



Grounding connection - On the electrical board, adjacent to the connection



Warning - safety valves' vents



Warning - high-temperature zones
Adjacent to hot pipes or components

2.8 Safety regulations

Refrigerant data	Safety data: R407C,R22
Toxicity	Low
Contact with skin	If sprayed, the refrigerant is likely to cause frost burns. If absorbed by the skin, the danger is very limited; it may cause a slight irritation, and the liquid is degreasing. Unfreeze the affected skin with water. Remove the contaminated clothes with great care - in the presence of frost burns, the clothes may stick to the skin. Wash with plenty of warm water the affected skin. In the presence of symptoms such as irritation or blisters, obtain medical attention.
Contact with eyes	Vapours do not cause harmful effects. The spraying of refrigerant may cause frost burns. Wash immediately with a proper solution or with tap water for at least 10 minutes, and then obtain medical attention.
Ingestion	Very unlikely - should something happen, it will cause frost burns. Do not induce vomiting. Only if the patient is conscious, wash out mouth with water and give some 250 ml of water to drink. Then, obtain medical attention.
Inhalation	R407C, R22: remarkable concentrations in the air may have an anaesthetic effect, up to fainting. The exposure to considerable amounts may cause irregular heartbeat, up to the sudden death of the patient. Very high concentrations may result in the risk of asphyxia, due to the reduction in the oxygen percentage in the atmosphere. Remove the patient to fresh air and keep warm and at rest. If necessary, give oxygen. In case of breathing difficulties or arrest, proceed with artificial respiration. In case of cardiac arrest, proceed with cardiac massage. Then, obtain medical attention.
Recommendations	Semiotics or support therapy is recommended. Cardiac sensitisation has been observed that, in the presence of circulating catecholamines such as adrenalin, may cause cardiac arrhythmia and accordingly, in case of exposure to high concentrations, cardiac arrest.
Prolonged exposure	R407C, R22: a study on the effects of exposure to 50,000 ppm during the whole life of rats has identified the development of benign testicle tumour. This situation should therefore be negligible for personnel exposed to concentrations equal to or lower than professional levels.
Professional levels	R407C, R22: Recommended threshold: 1000 ppm v/v - 8 hours TWA.
Stability	R407C, R22: Not specified.
Conditions to avoid	Do not use in the presence of flames, burning surfaces and excess humidity.
Hazardous reactions	May react with sodium, potassium, barium and other alkaline metals. Incompatible substances: magnesium and alloys with magnesium concentrations > 2%.
Hazardous decomposition products	R407C, R22: Halogen acids produced by thermal decomposition and hydrolysis.

General precautions	Do not inhale concentrated vapours. Their concentration in the atmosphere should not exceed the minimum preset values and should be maintained below the professional threshold. Being more weighty than the air, the vapour concentrates on the bottom, in narrow areas. Therefore, the exhaust system must work at low level.
Respiratory system protection	If you are in doubt about the concentration in the atmosphere, it is recommended to wear a respirator approved by an accident-prevention Authority, of the independent or oxygen type.
Storage	Cylinders must be stored in a dry and fresh place, free from any fire hazard, far from direct sunlight or other sources of heat, radiators etc. Keep a temperature below 45°C.
Protective clothing	Wear overalls, protective gloves and goggles or a mask.
Accidental release measures	It is important to wear protective clothing and a respirator. Stop the source of the leak, if you can do this without danger. Negligible leaks can be left evaporating under the sun, providing that the room is well ventilated. Considerable leaks: ventilate the room. Reduce the leak with sand, earth or other absorbing substances. Make sure that the liquid does not channelled into gutters, sewers or pits where the vapours are likely to create a stuffy atmosphere.
Disposal	The best method is recovery and recycling. If this method is not practicable, dispose according to an approved procedure, that shall ensure the absorption and neutralization of acids and toxic agents.
Fire fighting information	R407C, R22: Not flammable in the atmosphere.
Cylinders	The cylinders, if exposed to fire, shall be cooled by water jets; otherwise, if heated, they may explode.
Protective fire fighting equipment	In case of fire, wear an independent respirator and protective clothing

Lubricant oil data	Safety data: Polyester oil (POE)
Classification	Not harmful
Contact with skin	May cause slight irritation. Does not require first aid measures. It is recommended to follow usual personal hygiene measures, including washing the exposed skin with soap and water several times a day. It is also recommended to wash your overalls at least once a week.
Contact with eyes	Wash thoroughly with a suitable solution or tap water.
Ingestion	Seek medical advice immediately.
Inhalation	Seek medical advice immediately.
Conditions to avoid	Strong oxidising substances, caustic or acid solutions, excess heat. May corrode some types of paint or rubber.
Protection of the respiratory system	Use in well ventilated rooms.
Protective clothing	Always wear protective goggles or a mask. Wearing protective gloves is not mandatory, but is recommended in case of prolonged exposure to refrigerant oil.
Accidental release measures	It is important to wear protective clothing and, especially, goggles. Stop the source of the leak. Reduce the leak with absorbing substances (sand, sawdust or any other absorbing material available on the market).
Disposal	The refrigerant oil and its waste will be disposed of in an approved incinerator, in conformity with the provisions and the local regulations applicable to oil waste.
Fire fighting information	In the presence of hot liquid or flames, use dry powder, carbon dioxide or foam. If the leak is not burning, use a water jet to remove any vapours and to protect the personnel responsible for stopping the leak.
Cylinders	The cylinders exposed to a fire will be cooled with water jets in case of fire.
Fire fighting protective equipment	In case of fire, wear an independent respirator.

3 TRANSPORT, LIFTING AND POSITIONING

Refrigerators are supplied assembled (apart from standard antivibrating rubber supports, that will be installed on site). The equipment are full of refrigerant and oil, in the quantity required for a proper operation.

3.1 Inspection

When the unit is delivered, it is recommended to check it carefully and to identify any damage occurred during transportation. The goods are shipped ex-factory, at the buyer's risk. Check that the delivery includes all the components listed in the order.

In case of damage, note it down on the carrier's delivery note and issue a claim according to the instructions provided in the delivery note.

In the presence of any serious damage, that does not affect the surface only, it is recommended to inform Itelco-Industry immediately.

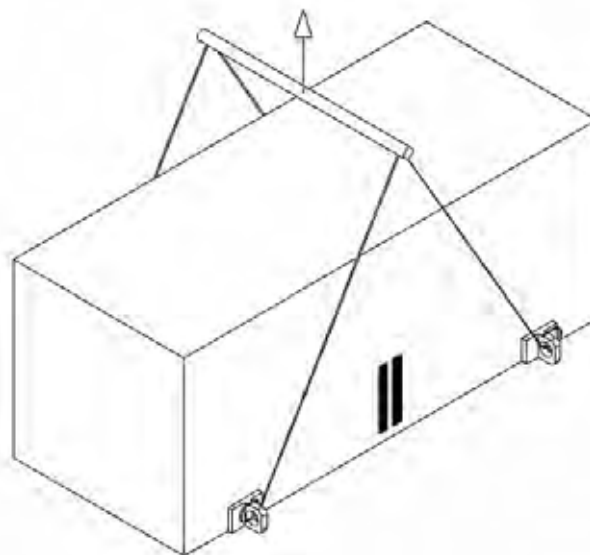
Please note that Itelco-Industry may not be held liable for any damage to the equipment during transportation, even though the carrier has been appointed by the factory.

3.2 Lifting

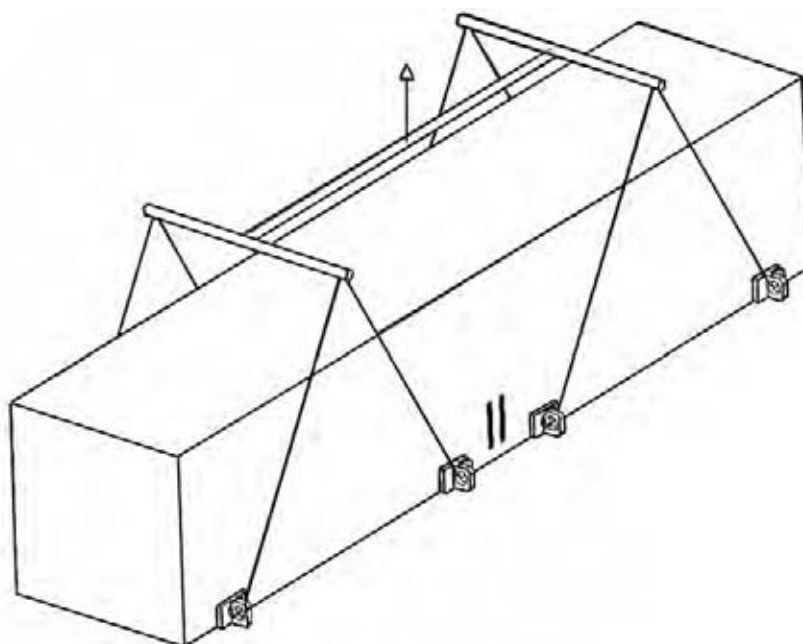
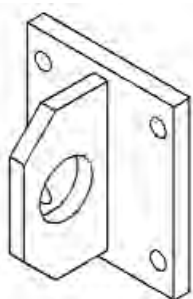
The unit must be lifted by using the hooks inserted into the relevant eyebolts (see the figure).

It is recommended to use a spacer to prevent cables from damaging the unit (see the figure).

Lifting 4/6 mt



Lifting 6 mt/8 mt/10 mt/12 mt



Before positioning the unit, make sure that the place of installation is appropriate and sturdy enough to hold the weight and to withstand the stress caused by the operation of the whole assembly.



Do not displace the unit on rollers, and do not lift it with a lift truck.

Unit must be lifted carefully.
To lift unit slowly and regularly.

To lift and displace the unit:

- Insert and secure eyebolts into the holes marked on the frame.
- Insert spacer between cables.
- Hook near the barycentre of the unit.
- The cables must be long enough to form, if tensioned, an angle of at least 45° with respect to the horizontal plane.



For lifting operations, use only tools and material fit for this purpose, in accordance with accident-prevention regulations.



During the lifting and handling of the unit, be careful not to damage the finned pack of the coils positioned on the sides of the unit. The sides of the unit must be protected by cardboard or plywood sheets.



It is recommended not to remove the protective plastic envelope, that should prevent scraps from penetrating into the appliance and any damage to the surfaces, until the unit is ready for operation.



The lifting eyebolts protrude from the base of the unit; it is therefore recommended to remove them once the unit has been lifted and positioned, if in your opinion they are likely to become a source of hazard and injury.

The eyebolts must be mounted on the unit whenever it shall be displaced and then lifted again.

3.3 Anchoring

It is not essential to secure the unit to the foundations, unless in areas where there is a serious risk of earthquake, or if the appliance is installed on the top of a steel frame.

3.4 Storage

When the unit is to be stored before installation, adopt a few precautions to prevent any damage or risk of corrosion or wear:

- plug or seal every single opening, such as water fittings
- do not store the appliance in a room where the temperature exceeds 50°C for the units using R407C and, if possible, do not expose to direct sunlight
- it is recommended to store the unit in a roof where traffic is minimized, to prevent the risk of accidental damage
- the unit must not be washed with a steam jet
- take away and leave to the site manager all the keys providing access to the control board

Finally, it is recommended to carry out visual inspections at regular intervals.

Installation

4 INSTALLATION

4.1 Positioning of the unit



Before installing the unit, make sure that the structure of the building and/or the supporting surface can withstand the weight of the appliance. The weights of the units are listed in Chapter 8 of this manual.

These units have been designed for outdoor installation on a solid surface. Standard accessories include antivibrating rubber supports, that must be positioned under the base.

When the unit is to be installed on the ground, it is necessary to provide a concrete base, to ensure a uniform distribution of the weights.

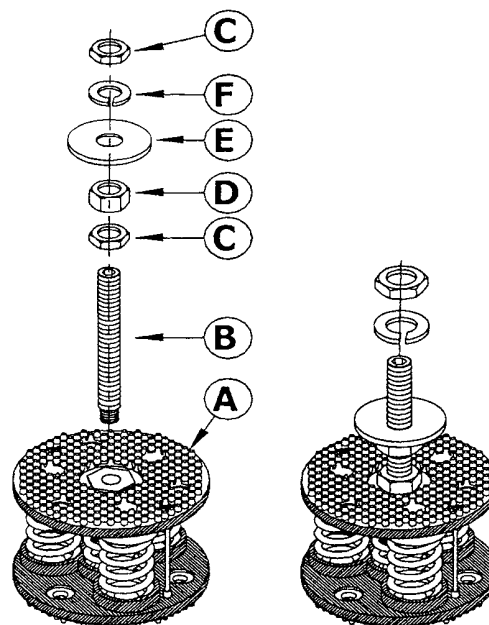
As a general rule, no special sub-bases are required. However, if the unit is to be installed on the top of inhabited rooms, it is advisable to rest it on spring shock absorbers (optional), that will minimise the transmission of any vibration to the structures.

To choose the place of installation of the unit, bear in mind that:

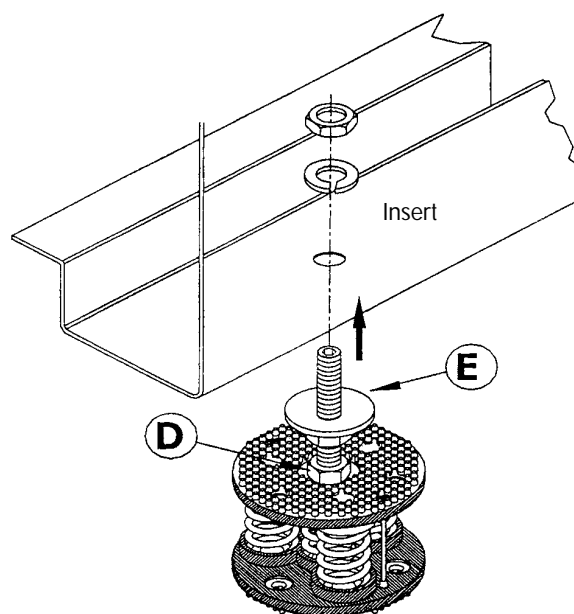
- the longitudinal axis of the unit must be parallel to the direction of prevailing winds, so as to ensure a uniform distribution of the air on finned exchangers
- the unit must not be installed near boilers' vent pipes
- the unit must not be installed leeward with respect to sources of air contaminated by greases, such as, for example, the outlets to kitchen exhaust hoods into the atmosphere. Otherwise, the grease is likely to deposit on the fins of the refrigerant /air exchangers, and would fix every type of atmospheric impurity, resulting in the quick clogging of the exchangers
- the unit must not be installed in areas subject to considerable snow falling
- the unit must not be installed in areas subject to flooding, under gutters etc.
- the unit must not be installed in air shafts, narrow courts or other small places, where the noise may be reflected by the walls or the air ejected by fans may short-circuit itself on refrigerant/air heat exchangers or condenser
- the place of installation must be have all the necessary spaces for air circulation and maintenance operations (see Chapter 9).

4.2 Spring Isolator Installation

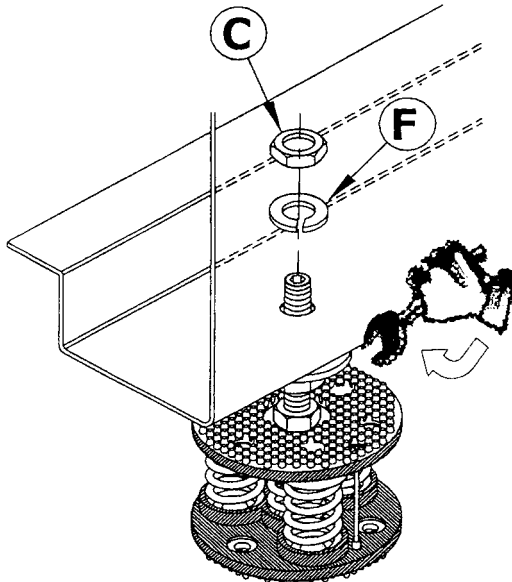
- Prepare the base, that must be flat and plane.
- Lift the appliance and insert shock absorbers as follows:



- 1) Proceed to assemble the jack components..



2) Fit the jack in the threaded housing on the upper plate of the antivibration mount. Next fit the jack mounted on the antivibration mount in the hole in the machine base.



3) Make sure the machine base is resting on the flat washer (pos. E) of the jack. To offset any levelling problems, adjust the top nut (pos. D) using an adequate spanner. Lock in position with grower washer (pos. F) and low nut (pos. C).

At the end of this operation, make sure the machine is elastic on the axes and compensating antivibration joints can be fitted in the water connections.

4.3 External hydraulic circuit



The external hydraulic circuit must ensure the water flow to the evaporator under any working or adjustment conditions.

The external hydraulic circuit should consist of the following elements:

- A circulation pump that can ensure the necessary capacity and discharge head.
- The capacity of the primary hydraulic circuit should not be less than 7.5 litres/KW of cooling capacity, in order to prevent the repeated start-up of the compressor and any damage to it. If the water capacity in the primary piping of the circuit and in the evaporator is lower than this value, an insulated storage tank shall be installed.

- A membrane expansion vessel provided with safety valve with vent, that must be visible.



The capacity of the expansion vessel must allow for an expansion of at least 2% of the volume of the fluid in the circuit (evaporator, piping, user circuit and standby tank, if any). The expansion vessel needs not be isolated, because no water can circulate inside it.

- A flow switch, to disable the appliance when the water is not circulating.



The flow switch must be connected (terminals 1-2) as shown in the wiring diagram of the "User's Terminal Box" (Paragraph 4.7).

To install the flow switch, follow the manufacturer's instructions.

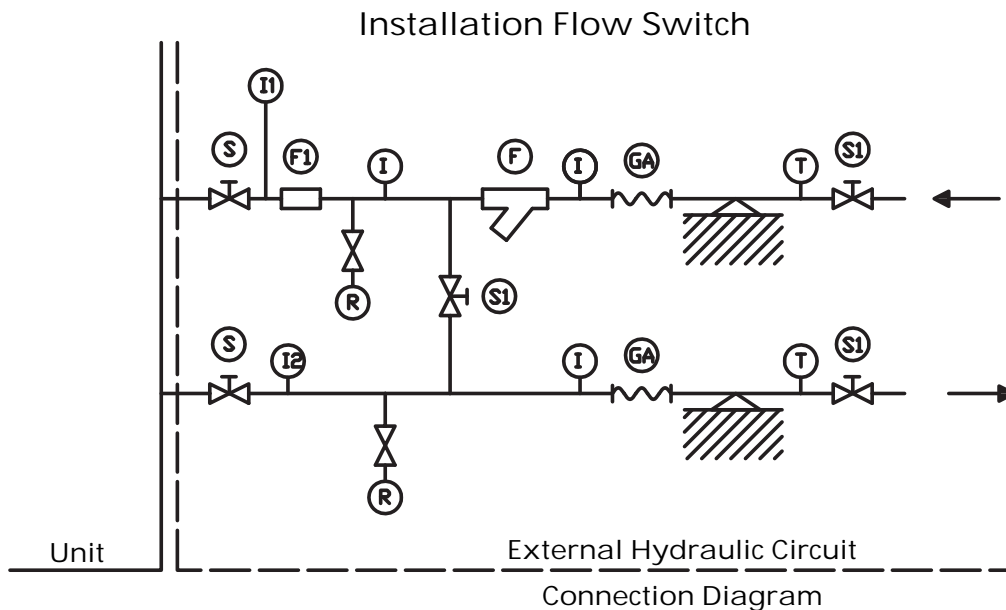
As a general rule, the flow switch shall be mounted on a horizontal pipe, at a distance from the curves equal to 10 times the diameter of the pipe and far from valves or other components that are likely to hinder the water flow upstream of or downstream from the flow switch.

- The bleed valves must be mounted on the highest point of the piping.
- The stop valves must be mounted on the piping of the water entering/leaving the condenser.
- The discharge points (provided with plugs, cocks etc.) must be arranged in the lowest point of the piping.

Installation

Then:

- Provide the evaporator with a by-pass circuit equipped with a valve to wash the plant.
- Insulate the piping, to prevent the risk of heat loss.
- Position a filter on the suction side of the evaporator of the heat recovery condenser.



Legends:

- I: Pressure gauge connection
- S: Gate valve
- F1: Flow Switch
- GA: Flexible hoses

- R: Drain cock
- T: Thermometer
- F: Filter
- I1/I2: Pressure gauge connection to measure pressure drop or head pressure



Before filling the circuit, it is important to check that it is free from any foreign matter, sand, gravels, rust, welding deposits, waste and other materials that may damage the evaporator.

When cleaning the lines, it is recommended to create a circuit by-pass. It is important to mount a filtering medium (30 mesh) upstream of the chiller.



If necessary, the water required to fill the circuit must be treated to obtain the requested PH.

4.4 Hydraulic connection

The water inlet/outlet fittings shall conform to the instructions provided by the plates affixed near the connection points.

4.5 Draining the defrosting waste water (for heat pump unit only)

When heat pump units work in heating mode, during defrosting cycles, they may discharge water from the base. This is why the units should be installed at least 200 mm above the floor level, so as to allow the free drainage of waste water, without the risk of producing ice banks.

The heat pump units must be installed in positions where the defrosting water cannot create any damage.

4.6 Power supply



Before carrying out any operations on the electrical system, make sure that the unit is deenergised.



It is important that the appliance is grounded.



The company in charge of the installation shall conform to the standards applicable to outdoor electrical connections.

Itelco-Industry may not be held liable for any damage and/or injury caused by failure to comply with these precautions.

The unit conforms to EN 60204-1.

The following connections shall be provided:

- A 3-phase and grounding connection for the power supply circuit.
- The electrical distribution system shall meet the power absorbed by the appliance.
- The disconnecting and magnetothermal switches must be sized to control the starting current of the unit.
- The power supply lines and the insulation devices must be designed in such a way that every line independent.
- It is recommended to install differential switches, to prevent any damage caused by phase drops.
- The fans and compressors are supplied through contactors controlled from the control panel.
- Each motor is provided with an internal safety thermal device and external fuses.
- The power supply cables must be inserted into dedicated openings on the front of the unit, and they will enter the electrical board through holes drilled on the bottom of the board.

4.7 Electrical connections

The unit must be installed on site according to the Machinery Directive (98/37/EC), the Low Voltage Directive (73/23/EC), the Electromagnetic Interference Directive (89/336/EC) and the usual procedures and standards applicable in the place of installation. The unit must not be operated if its installation has not been carried out according to the instructions provided in this manual.

The power supply lines must consist of insulated copper conductors, dimensioned for the maximum absorbed current.

Connection to terminals must be performed according to the diagram of connections (User's Terminal Box) provided in this manual and according to the wiring diagram which accompanies the unit.



Before connecting the power supply lines, check that the available voltage value does not exceed the range specified in the Electric Data (Chapter 8).

For 3-phase systems, check also that the unbalance between the phases does not exceed 2%. To perform this check, measure the differences between the voltage of each phase couple and their mean value during operation. The maximum % value of these differences (unbalance) must not exceed 2% of the mean voltage.

If the unbalance is unacceptable, contact the Energy Distributor to solve this problem.

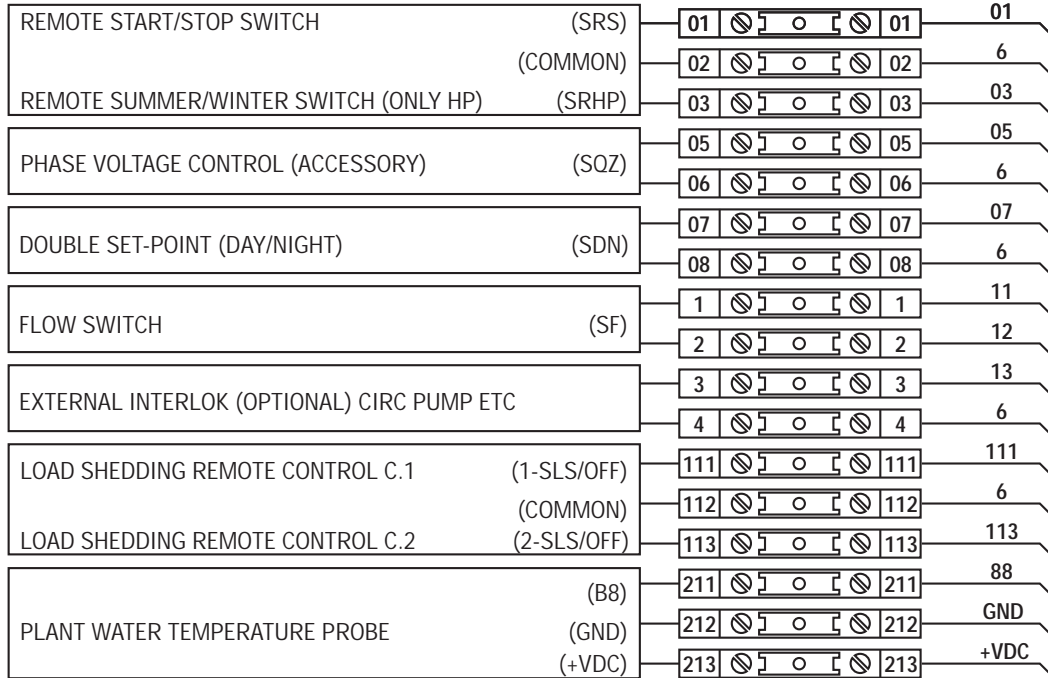


Supplying the unit through a line whose unbalance exceeds the permissible value will automatically void the warranty.

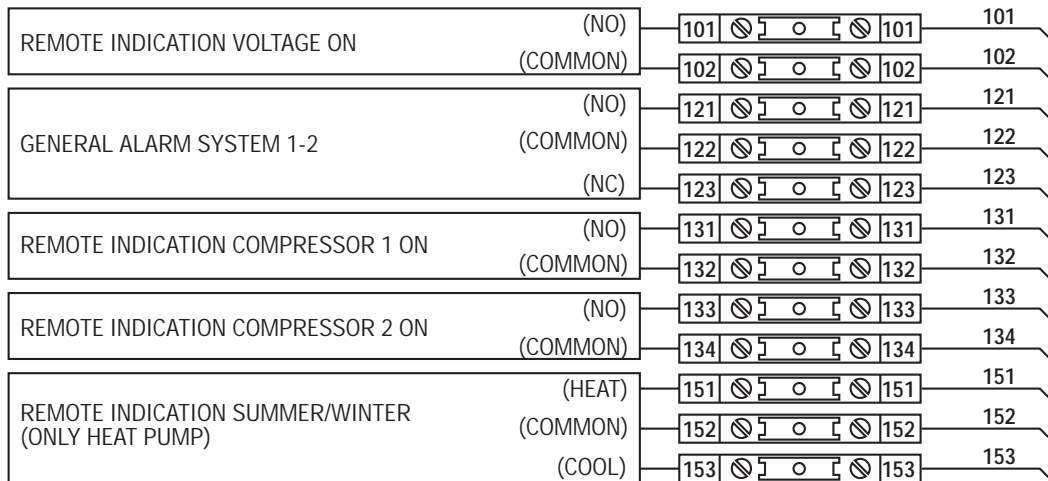
The SLS 3804 - 4004 and SLH 2804 - 3204 - 3604 - 3804 twin units are provided with two switchboards positioned at the ends of the units. A switchboard is identified as "Master" and includes the control panel (keyboard - display), the other as auxiliary "Slave". Each switchboard must be connected to the relative power supply line. A single point for power supply can be provided using a shunt board (supplied as an accessory).

Terminal box - SLS/SLH

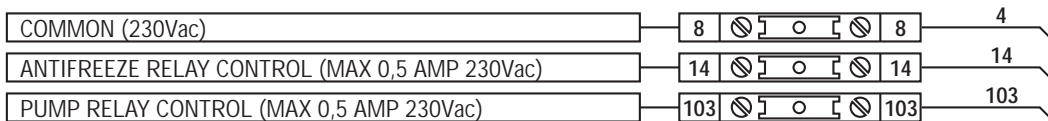
QG - Y1



QG - Y2

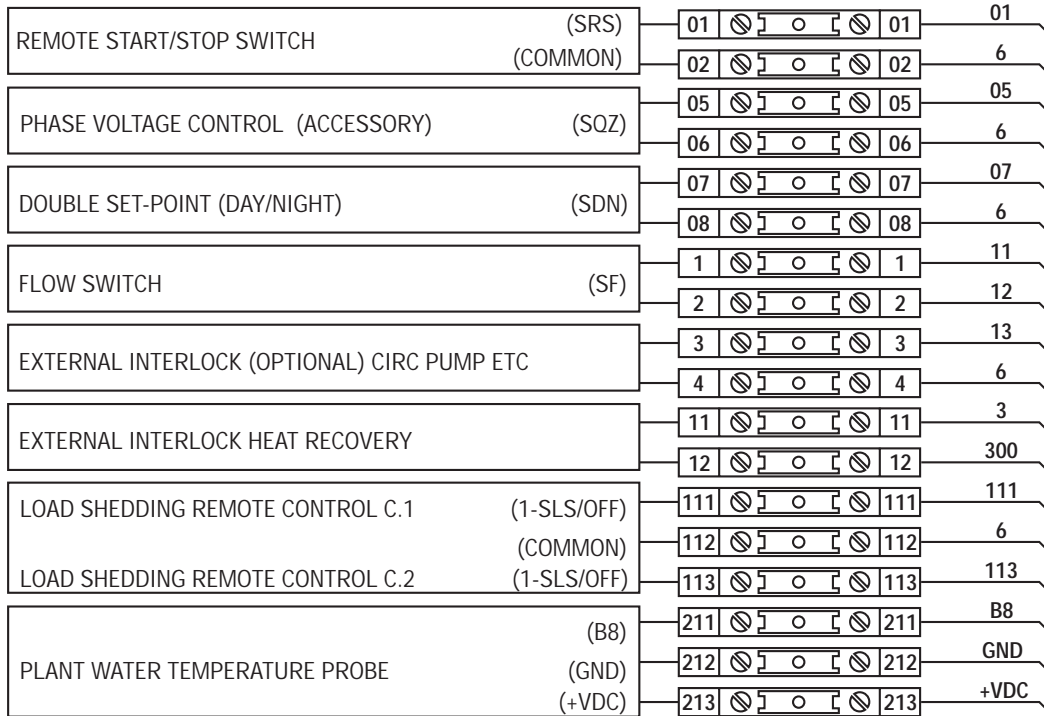


QG - Y3

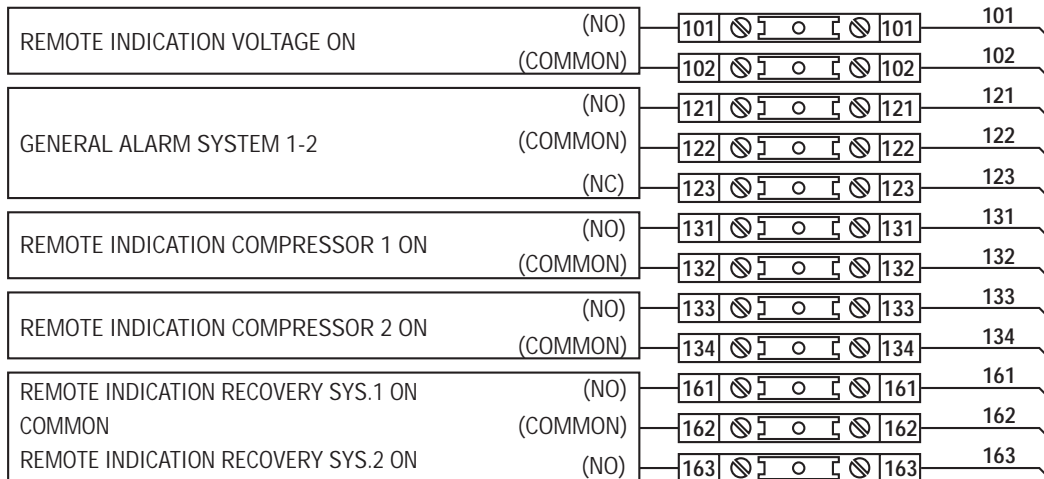


Terminal box - SLS-R

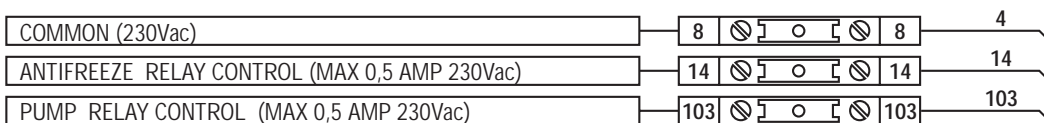
QG - Y1



QG - Y2

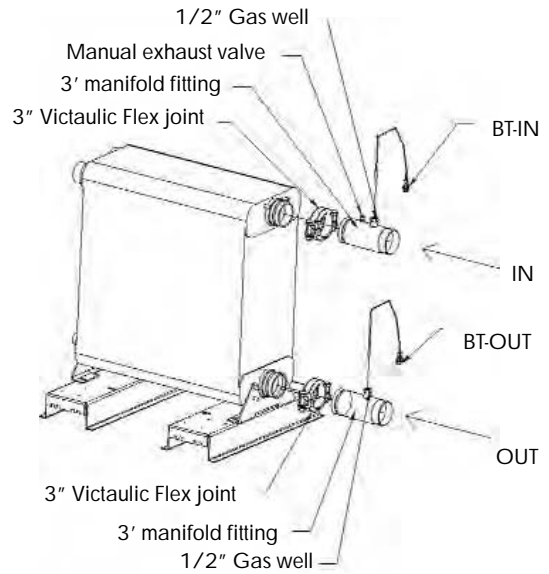


QG - Y3

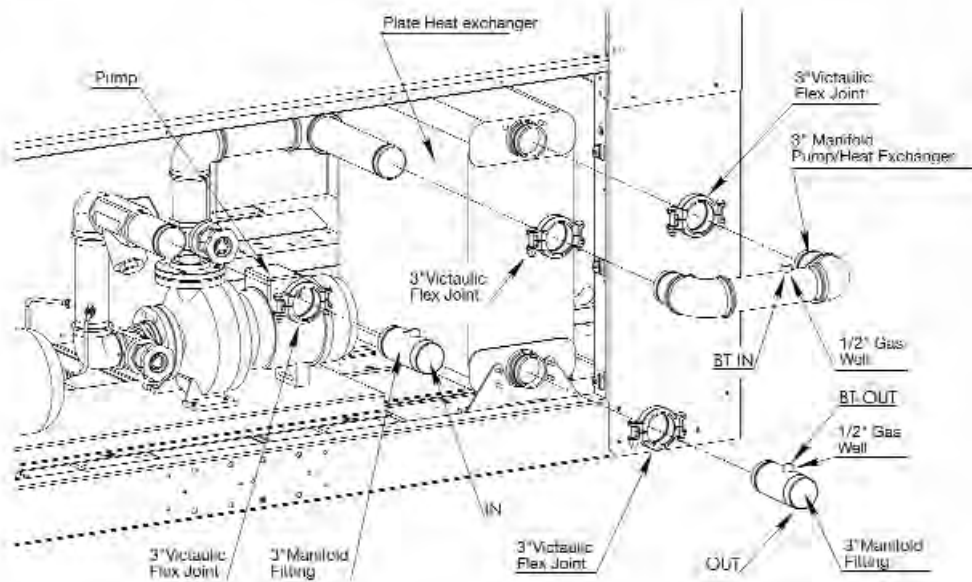


4.8 Connecting the plate-type evaporator's temperature sensors

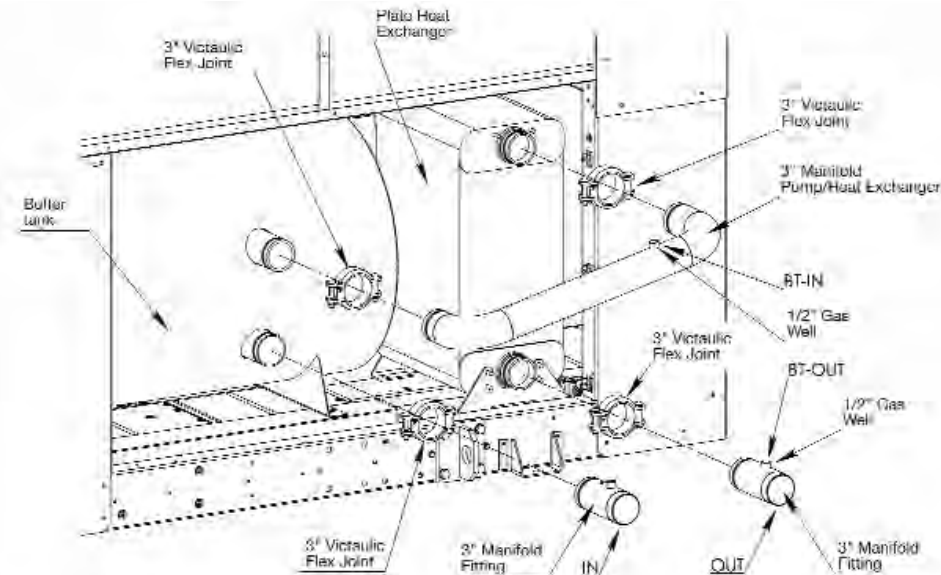
The SLH and SLS units with plate-type heat exchangers are provided with fittings for hydraulic connections between the heat exchangers and the plants, complete with sensor well to fasten the temperature sensors for the water entering and leaving the plant; they are supplied separate and must be mounted during the installation of the unit, as explained in the instructions below.



Connecting the plate type evaporator's temperature sensors (version with pump)



Connecting the plate type evaporator's temperature sensors (version with pump and buffer tank)

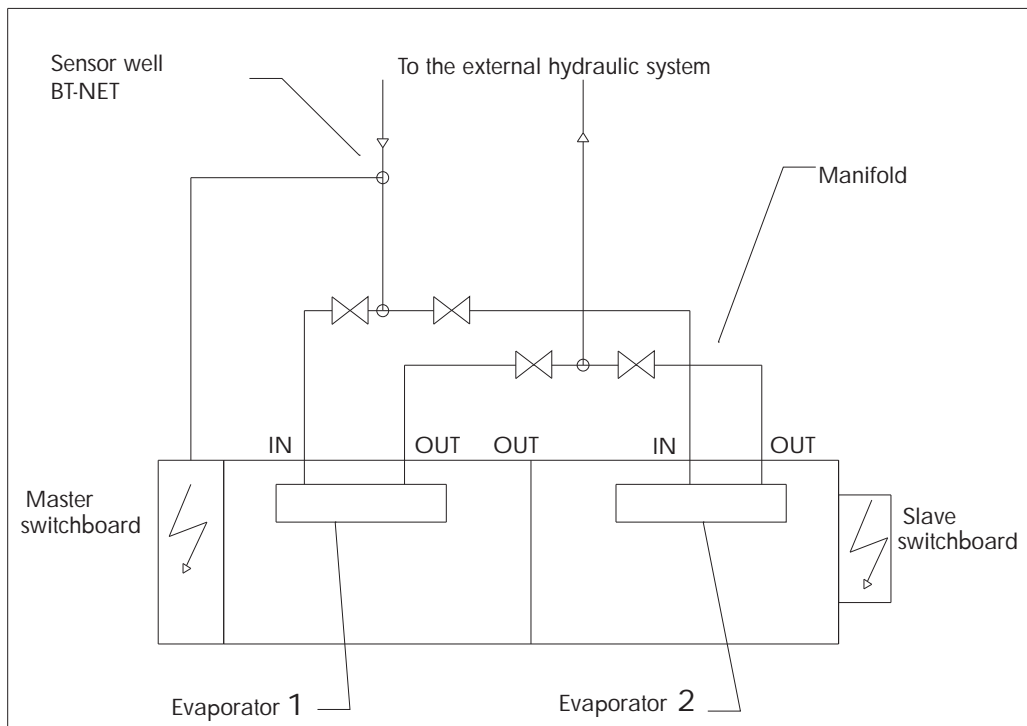


4.9 Connecting the temperature sensor of coupled units' manifold (SLS 3804-4004/SLH 2804-3204-3604-3804)

For the SLS 3804 - 4004 and SLH 2804 - 3204-3604 - 3804 units, the two heat exchangers (of plate or shell and tube type) must be connected in parallel through a manifold (to be provided by the customer). The supplied temperature control sensor for the wa-

ter returning from the plant is not installed on the unit. The sensor, through the relevant well, must be positioned on the manifold which connects the two heat exchangers, as explained in the instructions below.

Position Sensor from manifold Twin units



4.10 Total heat recovery features

Temperature sensors

Temperature sensors for recovery system water control, BTRin e BTRout, are supplied by factory with the unit, already wired, and must be fitted on the water connections at the heat reclaim condenser inlet and outlet (see wiring diagram).

Three-way valve

The three-way valve must be installed on-site. It permits bypassing the heat reclaim condenser for correct operation at low return water temperature. Water and electrical connections, as well as thermal insulation must be made at the time of installation on-site.

The best position is close to heat reclaim condenser (to achieve a small water circuit).

NOTE: The space required by this valve does not permit installation on the factory

Forced shuttering

When recovery system is on, a commutation from air condensing and water condensing takes place.

At the same time compressor is automatically shuttered to the 50% of its capacity for 2 minutes to allow the control of condensation in the transient phase. The same process takes place when the system commutates from water condensing to air condensing.

5 START-UP



The unit must be started for the first time by personnel suitably trained by one of Itelco-Industry's Authorised Service Centre. Failure to meet this requirement will immediately void the warranty.



The operations carried out by Itelco-Industry personnel are limited to the start-up of the unit, and do not include any other operation on the plant, such as, for example, electrical and hydraulic connections etc. All the other operations before start-up, including oil pre-heating for at least 12 hours, must be performed by the Installer.

5.1 Preliminary check

The checks listed below shall be performed before starting the unit and before the arrival of the personnel authorised by Itelco-Industry.

- Check the section of power supply and grounding cables; make sure that terminals are tightened and check the correct operation of contactors, with the master switch open.
- Check that any voltage and phase variation in the power supply does not exceed the prefixed thresholds.
- Connect the contacts of the flow switch and the thermal relay of the pump and of the other devices (if any), to terminals 1-2 and 3-4, respectively.
- Check that the components of the external water circuit (pump, user equipment, filters, power supply tank and reservoir, if any) have been installed properly, and according to the manufacturer's instructions.
- Check the filling of the hydraulic circuits, and make sure that the fluid circulation is correct, without any trace of leaks and air bubbles. If you use ethylene glycol as antifreeze, check that its percentage is correct.
- Check that the direction of rotation of the pumps is correct, and that fluids have been circulating for at least 12 hours for both pumps. Then, clean the filters on the suction side of the pumps.
- Adjust the liquid distribution network in such a way that the flow rate is within the specified range.
- Check that the water quality is up to the specifications.

- Check position of temperature sensor to defrost (only heat pump).
- Check that oil heaters, if any, have been turned on at least 12 hours before.

5.2 Start-up

Start-up sequence:

- Turn on the master switch (at least 12 hours before).
- Check that the oil in the compressor has reached the requested temperature (the minimum temperature outside the pan must be approx. 40°C) and that the auxiliary control circuit is energised.
- Check the operation of all the external equipment, and make sure that the control devices of the plant are properly calibrated.
- Start the pump and check that the water flow is correct.
- Set the desired fluid temperature on the control board.
- Start the appliance (see Chapter 6).
- After about 15 minutes of operation check that there are no bubbles, through the sight glass on the liquid line.



The presence of bubbles may indicate that a part of the refrigerant charge has been released in one or more points. It is important to remove these leaks before proceeding.

Repeat the start-up procedure after removing the leaks.

Check the oil level in the compressor's sight glass.

5.3 Checking the operation

Check the following:

- The temperature of the water entering the evaporator.
- The temperature of the water leaving the evaporator.
- The level of the water flow rate in the evaporator, if possible.
- The current absorption upon the start of the compressor and in case of stabilised operation.
- The fan's current absorption.

Check that the condensing and evaporation temperatures, during operation at high and low pressure detected by the pressure gauges of the refrigerant, are within the following range:

(On the units not provided with HP/LP pressure gauges for the refrigerant, connect a pressure gauge to the Schrader valves on the refrigeration circuit).

HP side	Approx. 15 to 21°C above the temperature of the air entering the condenser, for R407C units.
LP side	Approx. 2 to 7°C below the temperature of the leaving chilled water, for R407C units.

5.4 Delivery to the customer

- Train the user according to the instructions provided in Section 6.

6 OPERATION

The units SLS/SLH are equipped with a microprocessor control logic and regulation management system.

The system consists of a unit logic board and a liquid crystal control panel which manages the control, starting, shutdown and display functions.

6.1 General Informations

■ Introduction

The information and the operating instructions of the electronic control system mounted on the unit are listed here below.

■ Main characteristics

- Microprocessor control
- User friendly easy reachable keyboard
- Proportional – Integral control of return water temperature (RWT)
- Hysteresis type control of leaving chilled water temperature (LWT)
- Access code to Service Level
- Acoustic and LED alarm indication
- Backlighted liquid crystals display
- Closed loop condensing pressure control
- Start and stop pump down logic
- Cooling capacity steps rotation
- Oil recovery function
- Night (or Double set point) function management
- Compressor and pump working hours meter
- Discharge and suction pressure display
- Memorized alarms history
- 4 set point time programs

Possibility to connect:

- Serial Communication Card RS485: to connect the *Chiller Control* to a BMS (MODBUS or LONWORK or BACNET)
- Remote Display Terminal
- Remote control
- Phase monitoring kit
- Chiller Data Logger

- “Chiller Control” system for SLS/H two screw compressors units

These cooling only water chillers are provided with a microprocessor board having a default program for the management of two refrigeration circuits each one equipped with one twin screws compressor, one low pressure transducer and one high pressure transducer. The control system consists of:

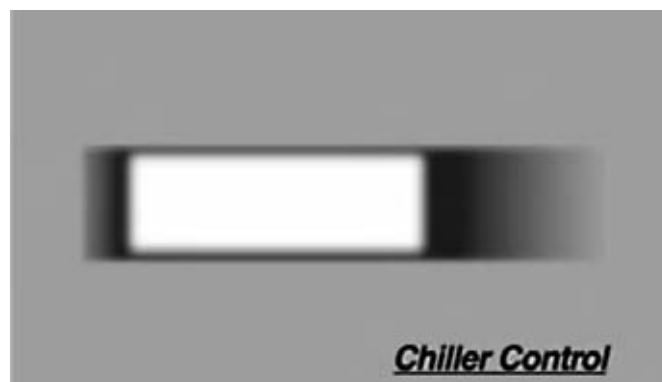
- INTERNAL ELECTRONIC PCB
- TERMINAL UNIT WITH DISPLAY AND KEYBOARD
- CHILLED FLUID TEMPERATURE SENSORS
- AMBIENT AIR TEMPERATURE SENSORS
- COIL TEMPERATURE SENSORS
- HIGH PRESSURE TRANSDUCER
- LOW PRESSURE TRANSDUCER

6.2 Keyboard – Display Terminal Unit

■ General Information

The figure which follows shows the terminal unit with open access door.

On the figure it is possible to see the microprocessor managed 4 lines – 20 columns LCD display, the keyboard and the LEDs which allow to program all the control parameters as setpoints, differential band, alarm thresholds and to perform the main functions.

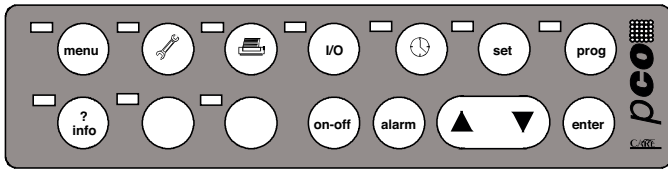


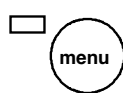
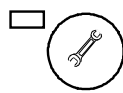
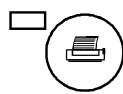
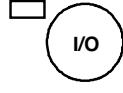
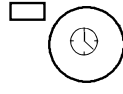
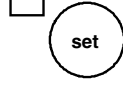
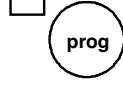
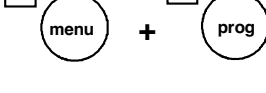

■ Keyboard

The terminal unit allows the operator to perform the following operations:

- initial configuration of the unit
- modification of the main working parameters
- displaying of the alarms and their notification by “buzzer”
- displaying of all the measured parameters.

The connection between the terminal unit and the board is realized by a 6 ways phone cable. The connection between the terminal unit and the main board is not strictly necessary to the normal operation of the controller.



-  Access to the displaying mask of the main parameters and unit status mask.
-  Access to devices maintenance parameters (elapsed working hour of the device and reset of the hours meter, alarm history) (Service Level)
-  Not Available
-  Access to the displaying masks of digital and Analog inputs and outputs status and of the software release.
-  Access to clock programming mask
-  Access to the displaying / programming masks of the control setpoint (User Level - Setpoint)
-  Access to "Service level" masks
-  Pushing this key together it is possible to access to the "Manufacturer Level"
-  Used only for unit with four compressors or back to back configuration with Master Slave. Switch the displaying Master unit control / Slave unit control.

The LEDs of each keys light up when the function related to the key is active.



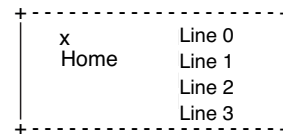
Figure 1



1. On/Off key: it allows to switch on and off the unit. Unit status is indicated by the lighting of the green LED.
2. Alarm key: it is used to display the alarms, to manually reset the alarms and to arrest the buzzer. If the key is lighted in red it means that at least one alarm was detected. Pushing one time this key the buzzer is arrested and the mask related the active alarm is displayed. Pushing it a second time the alarm is reset.
3. Upward arrow key: it allows to program the control parameters and to move between the masks (not backlighted).
4. Downward arrow key: it allows to program the control parameters and to move between the masks (not backlighted).
5. Enter key: it allows to move the cursor inside the masks and to save the programmed parameters. This key is continuously backlighted (in yellow) to show that the unit is under power.

■ Display

Il display utilizzato è del tipo a LCD 4 righe x 20. The unit is equipped with a 4 lines – 20 columns LCD display.

The parameters and the operation information are shown in pages called "masks". The navigation inside each mask is possible using as follows the terminal unit keys.



When cursor position corresponds to the left corner of the upper part of the display (Home) pushing the  arrow keys it is possible to access to the masks which are associated to the selected field. If a mask contains parameters programming fields, pushing the key ENTER the cursor will move to those fields. When it reaches one of the programming fields, using the  arrow keys it is possible to modify the relevant value within its programming range. The modified value must be confirmed pushing the ENTER key.

Operation

6.3 Functions / Keys / Configurations

■ Alarms table

Code	Alarm Description	Comp 1 Status	Comp 2 Status	Fan #1 Status	Fan #2 Status	Pump Status	Notes
AL00	Compressor stop	Due to auto-reset alarm. Just stored into the historical					
AL01	Wrong power	Off	Off	Off	Off	Off	Phase monitor (1)
AL02	Antifreeze alarm	Off	Off	Off	Off	On	
AL03	Interlock	Off	Off	Off	Off	Off	
AL04	Flow switch alarm	Off	Off	Off	Off	Off	
AL05	System #1 low suction pressure	Off	On	Off	On	On	
AL06	System #2 low suction pressure	On	Off	On	Off	On	
AL07	System #1 high discharge pressure	Off	On	Off	On	On	
AL08	System #2 high discharge pressure	On	Off	On	Off	On	
AL09	Compressor #1 thermal protection	Off	On	Off	On	On	
AL10	Compressor #2 thermal protection	On	Off	On	Off	On	
AL11	Recovery antifreeze alarm	On	On	On	On	On	
AL12	System #1 group #1 fan thermal protection	On	On	Off gr. # 1	On	On	
AL13	System #1 group #2 fan thermal protection	On	On	Off gr. # 2	On	On	
AL14	System #2 group #1 fan thermal protection	On	On	On	Off gr. # 1	On	
AL15	System #2 group #2 fan thermal protection	On	On	On	Off gr. # 2	On	
AL16	System #1 compressor differential pressure	Off	On	Off	On	On	
AL17	System #2 compressor differential pressure	On	Off	On	Off	On	
AL18	Clock board failure	On	On	On	On	On	
AL21	B1-Tin sensor failure	Off	Off	Off	Off	On	
AL22	B2-LP1 sensor failure	Off	On	Off	On	On	
AL23	B3-DP1 sensor failure	Off	On	On	On	On	
AL24	B4-Tair sensor failure	On	On	On	On	On	
AL25	B5-Tout sensor failure	Off	Off	Off	Off	On	
AL26	B6-LP2 sensor failure	On	Off	On	Off	On	
AL27	B7-DP2 sensor failure	On	Off	On	On	On	
AL28	B8-Tplan sensor failure	Off	Off	Off	Off	On	
AL29	B9-Trin/TC1 sensor failure	On	On	On	On	On	note (2)
AL30	B10-Trout/TC2 sensor failure	On	On	On	On	On	note (2)
AL31	System #1 compressor maintenance	On	On	On	On	On	
AL32	System #2 compressor maintenance	On	On	On	On	On	
AL33	Pump maintenance	On	On	On	On	On	
AL36	System #1 Low pressure	Off	On	Off	On	On	note (3)
AL37	System #2 Low pressure	On	Off	On	Off	On	note (3)

Note:

1 = Check power phases rotation and/or minimum voltage. It works only in case the Phases Monitor (accessory) is installed.

2 = It forces to leave the recovery mode. Recovery mode inhibited.

3 = Just stored into the historical

■ "Menu" key

Pushing the "Menu" key the main mask is displayed:

```

U:1 RWT ..... 0.0 °C
SYS#1: OFF
SYS#2: OFF
Unit.. ON

```

In this mask the following items are displayed:

- unit serial number and control temperature
- system #1 status
- system #2 status
- unit status

■ I/O (input / output) Status

Pushing the “I/O” key it is possible to access to all the masks showing the values read by all the sensors installed on the unit.

Sensor	Use
Tin	Entering chilled fluid temperature
Tout	Leaving chilled fluid temperature
TpLAN	Installation control sensor (in case of “Chiller Network”) Control sensor unit 4 compressors
SP #1	System #1 suction pressure transducer
DP #1	System #1 discharge pressure transducer
SP #2	System #2 suction pressure transducer
DP #2	System #2 discharge pressure transducer
Tair	Ambient air temperature
TC #1	Coil 1 temperature (only SLH)
TC #2	Coil 2 temperature (only SLH)
TRin	Heat recovery heat exchanger entering water temp.
TRout	Heat recovery heat exchanger leaving water temp.

The following items are also displayed:

1. Chiller Control digital inputs and outputs status
2. Analog outputs driving the fan speed controllers
3. Code and release of the “Chiller Control” software.

■ Maintenance

Pushing the “Maintenance” key it is possible to access to the following information masks:

1. ALARM HISTORY

```

N°0000
AL000 00:00 00/00/00
Setpoint .....00.0 °C
Temperature ..... 00.0 °C
    
```

Pushing the “Enter” the cursor enter in the list of the memorized alarms. At this point the arrow keys allow to scroll the masks of all the memorized alarms which show the date, time, code and the controlled water temperature (entering or leaving) at the moment in which the alarm itself was detected.

2. PUMP WORKING HOURS

```

U:1
Pump..... 00000 h
    
```

3. COMPRESSORS WORKING HOURS

```

U:1 SYS #1
Compressor      00000 h
U:1 SYS #2
Compressor      00000 h
    
```

4. PASSWORD (*)

```

U:1
Digit password
          0000
    
```

Note (*): Contact Itelco Clima Service Department to access to the following masks.

RST_HOUR METERS

```

Reset hours U:1
pypm ..... N
compressors
SYS #1 N SYS #2 N
    
```

MSK_FILTERS

```

Enabling software
filters ..... S
Threshold ..... 00.5 °C
Interval ..... 020 sec
    
```

M_DISABLE

```

Enabling
compressors
SYS #1=Y SYS #2=Y
    
```

M_OFFSET1

```

Sensors calibration
Tin ..... 0.0 °C
SP #1 ..... 0.0 bar
DP #1 ..... 0.0 bar
    
```

M_OFFSET2

```

Tair ..... 0.0 °C
Tout ..... 0.0 °C
SP #2 ..... 0.0 bar
DP #2 ..... 0.0 bar
    
```

M_OFFSET3

```

Sensors calibration
TpLAN ..... 0.0 °C
TRin ..... 0.0 °C
TRout ..... 0.0 °C
    
```

Operation

HOUR_THRES

Maintenance alarm threshold 003X1000h

■ Setpoint

Pushing the "Set" key it is possible to access to user's Setpoint level. The following table contains the details of the parameters which is possible to set with the relevant limitations and default values:

User's Setpoints	Control of	Low Limit	High Limit	Default			
System #1 ON/OFF	—	OFF	ON	OFF			
System #2 ON/OFF	—	OFF	ON	OFF			
Cooling Setpoint	Inlet Outlet	8 6	20 20	10 8			
Heating Setpoint	Inlet Outlet	20 20	48 50	43 45			
Glycol setpoint	Inlet Outlet	-15 -15	20 20	10 8			
Band Dead band	Inlet Outlet	1 1	10 6	5 2			
Language Selection	—	ITA	ENG	GER	FRA	SPA	ITA
Recovery System #2 ON/OFF System #1 ON/OFF	— —	OFF OFF	ON ON	OFF OFF			
Recovery Setpoint Band	Recovery Recovery	30 2	50 6	45 4			

■ Clock Key

To have access to the following mask:

DATE, DAY AND TIME

U:1 Clock	
Hour	00:00
Day	
Date	00/00/00

SETPOINTS TIMING

Setp1 = 00.0 - 00:00h
Setp2 = 00.0 - 00:00h
Setp3 = 00.0 - 00:00h
Setp4 = 00.0 - 23:59h

TIMING PERIODS ENABLING

Day timing periods with setpoint variationsN

NIGHT SETBACK MODE (*)

Night Mode
PM 22:00 AM 06:00

(*) Only if this mode is enabled in Service Level.

7 GENERAL DESCRIPTION

7.1 Introduction

The SLS/SLH units are water chillers/air-water heat pumps with screw compressors provided with two or four refrigeration circuits.

These units are fit for cooling and heating water or intermediate fluids (glycolated water) for air-condition-

ing applications or industrial processes.

The units are fit for outdoor installation on the roof of a building or at ground level.

The series includes the following versions:

Version	Description
SLS/SLH Standard version (BLN) SLS/SLH Low Noise version (LN) SLS/SLH Extra Low Noise version (ELN) SLS/SLH High Efficiency/Temperature version (HET)	Chillers/ heat pumps with air condensation, working with R407C (with R22 on demand for extra-European countries)

Available options:

Options	Description
SLS/D SLH/D	The heat recovery is carried out through a desuperheater mounted on the compressor's delivery line.
SLS - R	The unit features an additional water heat exchanger on the gas discharge line fitted in parallel with the standard cooling circuit. The heat recovery function is by means of a four-way valve.

7.2 General specifications

The SLS/H units are supplied complete and provided with all connecting pipes for the refrigerant and internal wiring.

The refrigeration circuit of each unit undergoes a pressure test, is drained, vacuumised, dehydrated and filled with refrigerant, and includes the necessary oil. Once assembled, each unit is subjected to a complete final testing and the correct operation of all refrigeration circuits is checked.

The base and the frame of each unit are made of very thick galvanised sheet, and are secured by stainless steel screws and bolts. All panels are secured by screw and tropicalised steel bolts, they can be disassembled for easy access to internal components. All panels can be disassembled for easy access to internal components. All galvanised steel parts are painted with white polyester resin (RAL 9001).

7.3 Compressors

The SLS/H units are provided with high power, high efficiency and low vibration level semi-hermetic screw compressors (oil injection or external cooling with plate-type exchangers) to reduce the compressor's discharge temperature, and to work at higher room temperatures (Chiller), or to produce hot water also at low room temperatures (Heat Pump).

The capacity control, of the step type, is handled by capacity control solenoid valves, handled by the microprocessor of the appliance.

The motor's terminals are weatherproof, according to standard IP-54.

7.4 Refrigeration circuits

The SLS units (13 sizes, 1202 to 4202) are provided with two independent circuits with screw compressors for each circuit and dual circuit plate-type heat exchangers of the "True Dual" type, up to size 2602 and with "S&T" shell and tube heat exchanger for the 3002 - 3402 - 3802 - 4202 sizes. The SLS 3804 and 4004 twin units are provided with four independent circuits with screw compressors for each circuit and dual circuit plate-type heat exchangers.

The SLH units (9 sizes, 1202 to 2602) are provided with two independent circuits with screw compressors for each circuit and dual circuit plate-type heat exchangers of the "True Dual" type. The SLH 2804 - 3204 - 3604 - 3804 twin units are provided with four independent circuits with screw compressors for each circuit and dual circuit plate-type heat exchangers.

Each refrigerant circuit includes: a service valve for refrigerant filling, shutoff valves for suction lines (on request), as well as for the delivery and liquid lines, a thermostatic expansion valve with external equalizer, a solenoid valve that makes it possible to start/stop the compressor, a dehydrating cartridge filter, a sight glass with humidity indicator, a differential oil pressure switch. Furthermore, each circuit is equipped with safety devices in accordance with PED 97/23/EC: high and low pressure switches, safety valves providing protection in case of fire or malfunction of compressors.

General Description

7.5 Water heat exchanger

Evaporator

All units, except for SLS 3002 and SLS 3402 - 3802 - 4202, are equipped with refrigerant/water heat exchangers with brazed plates, of "Dual Circuit" type. This type of heat exchangers makes it possible to obtain a high heat exchange efficiency, in spite of its small overall dimensions.

The SLS 3002 and SLS 3402 - 3802 - 4202 units are provided with a direct-expansion refrigerant/water shell and tube heat exchanger with several refrigeration circuits. The tube bundle can be removed for inspection or maintenance. The evaporators are insulated with UV ray-proof 19 mm-thick anti-condensate closed-cell polyethylene material.

The external surface is provided with wire resistors (130 Watt), which prevent frosting at low temperatures (down to -18°C) when the unit is off.

Desuperheater

All units are available with desuperheaters (DSH). DSH is refrigerant / water heat exchanger with brazed plates, of "Dual Circuit" type. DSH is fitted on the compressor discharge pipe and it's dimensioned to recover the 20% of total rejected heat. Each unit is equipped with 2 exchangers, one for each circuit. Exchangers are insulated with UV ray-

proof 19 mm-thick anticondensate closed-cell polyethylene material.

Total heat recovery condenser

All units are available with total heat recovery condenser (THRC). THRC is refrigerant / water heat exchanger with brazed plates or shell and tube, according to chiller size. THRC is fitted on the compressor discharge pipe in parallel with the standard cooling circuit. The heat recovery function is by means of a four-way valve. Each unit is equipped with 2 exchangers, one for each circuit. Exchangers are insulated with UV ray-proof 19 mm-thick anti-condensate closed-cell polyethylene material.

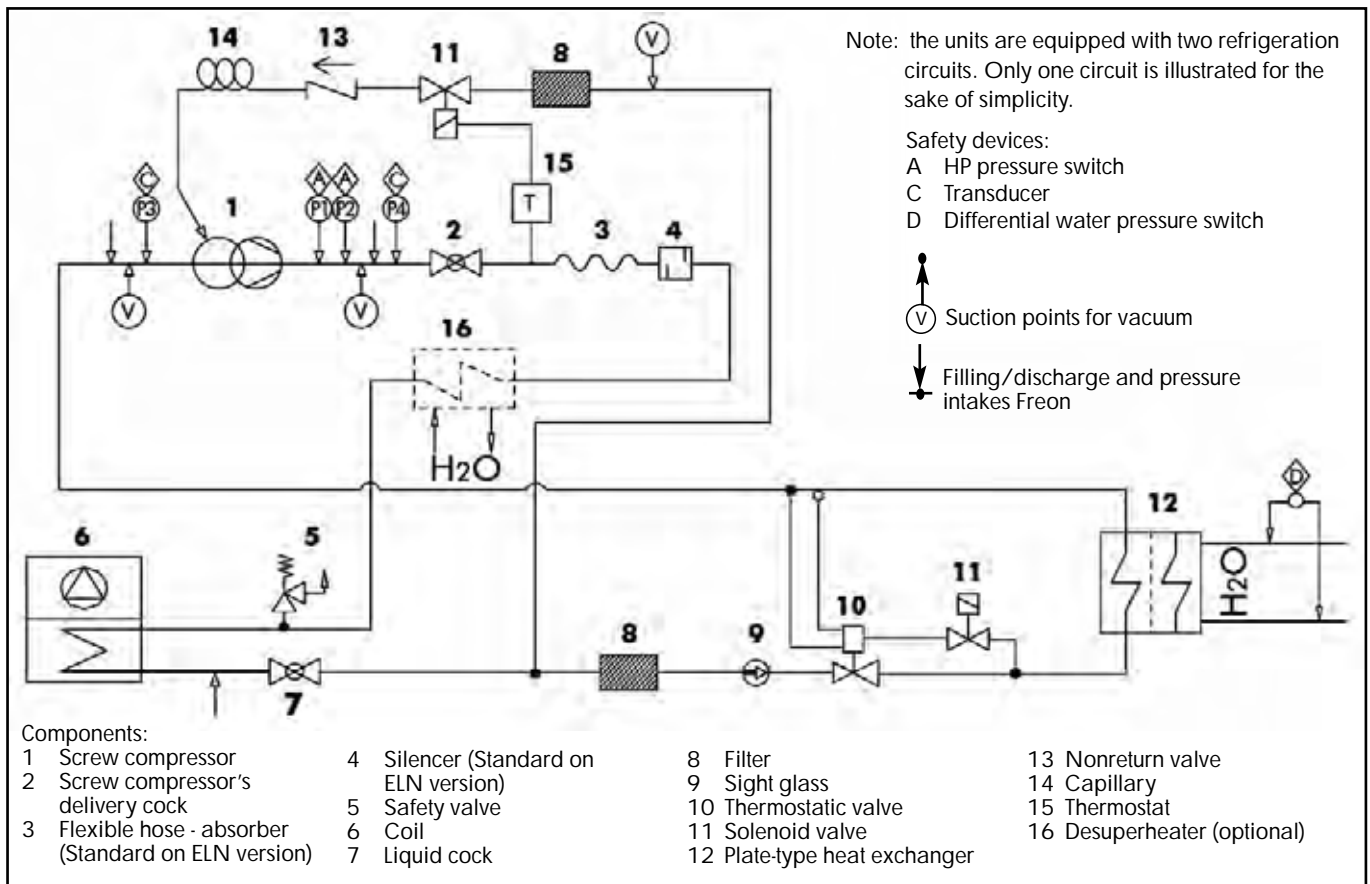
7.6 Air heat exchanger

Coils are made of copper pipes in staggered rows, mechanically expanded inside an aluminium finned pack.

7.7 Fans

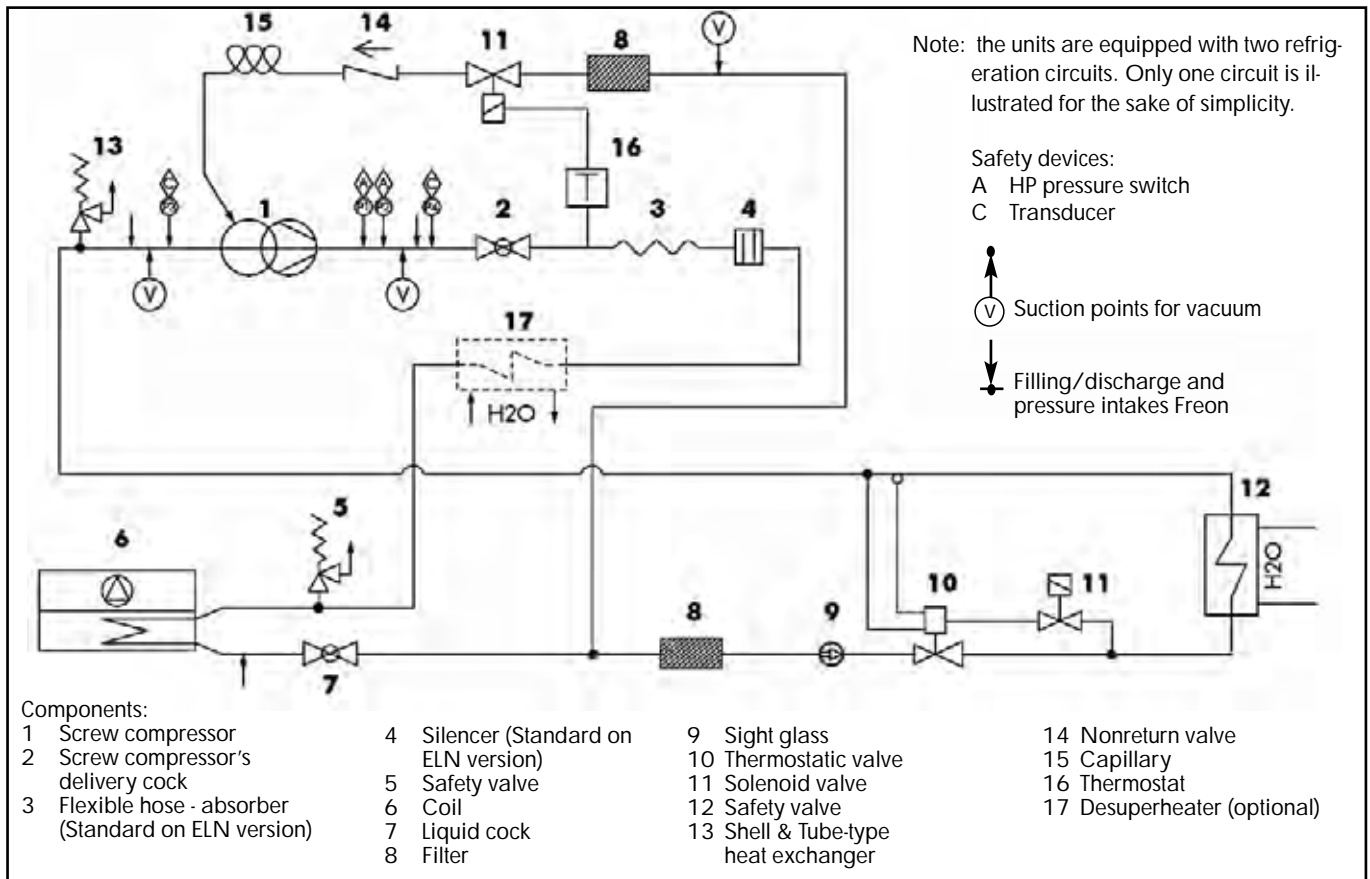
The condenser's fans are of large diameter (800 mm) axial type. They are provided with external diffusers (nozzles), that reduce the aeraulic motor to a large extent. Each fan is provided with galvanised steel accident-prevention guard, painted after assembly. Finally, the fans' motors are completely closed, protection class IP54, protection thermostat immersed in windings.

SLS - Refrigerant circuit of units with plate exchanger evaporator

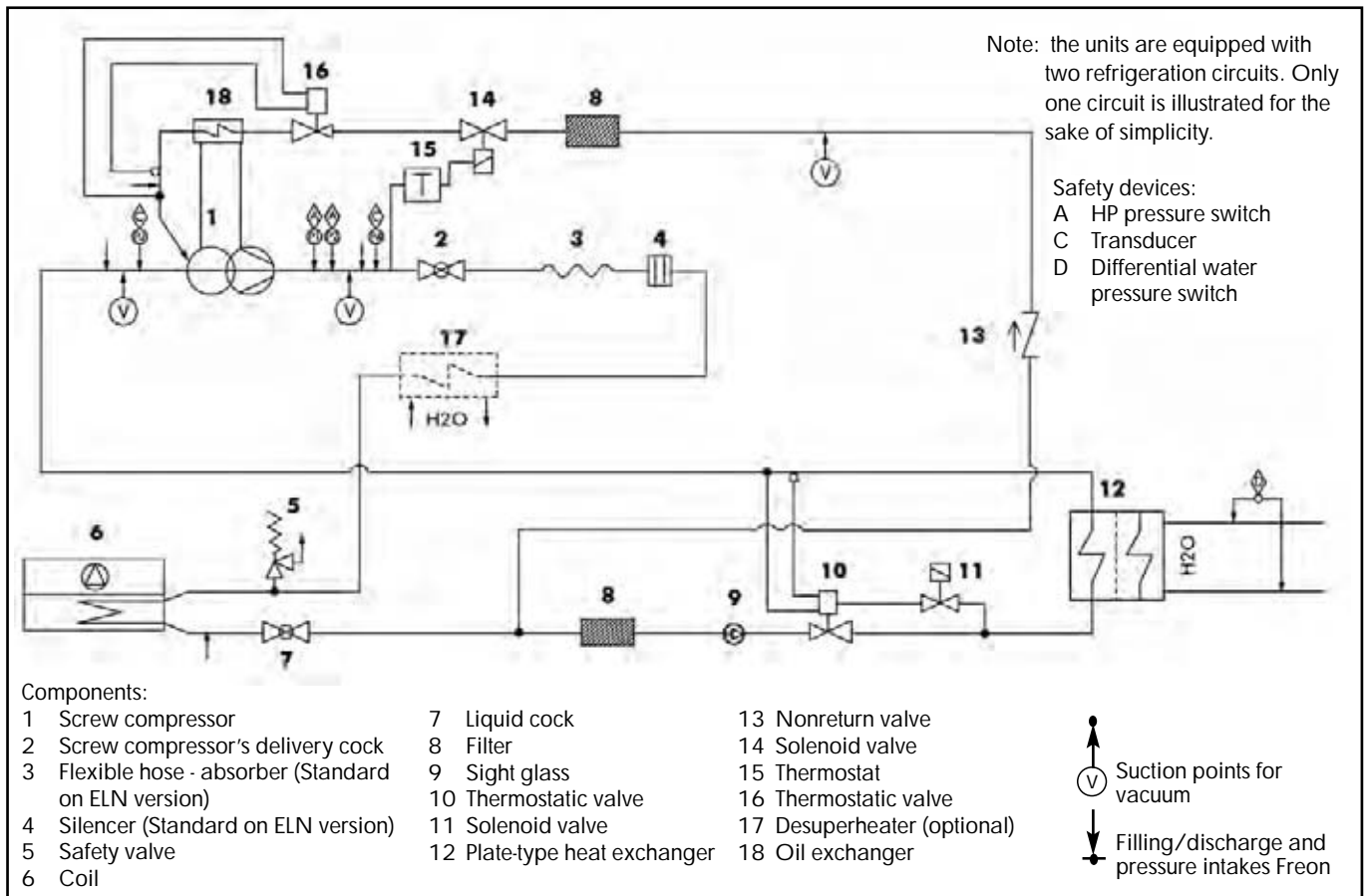


General Description

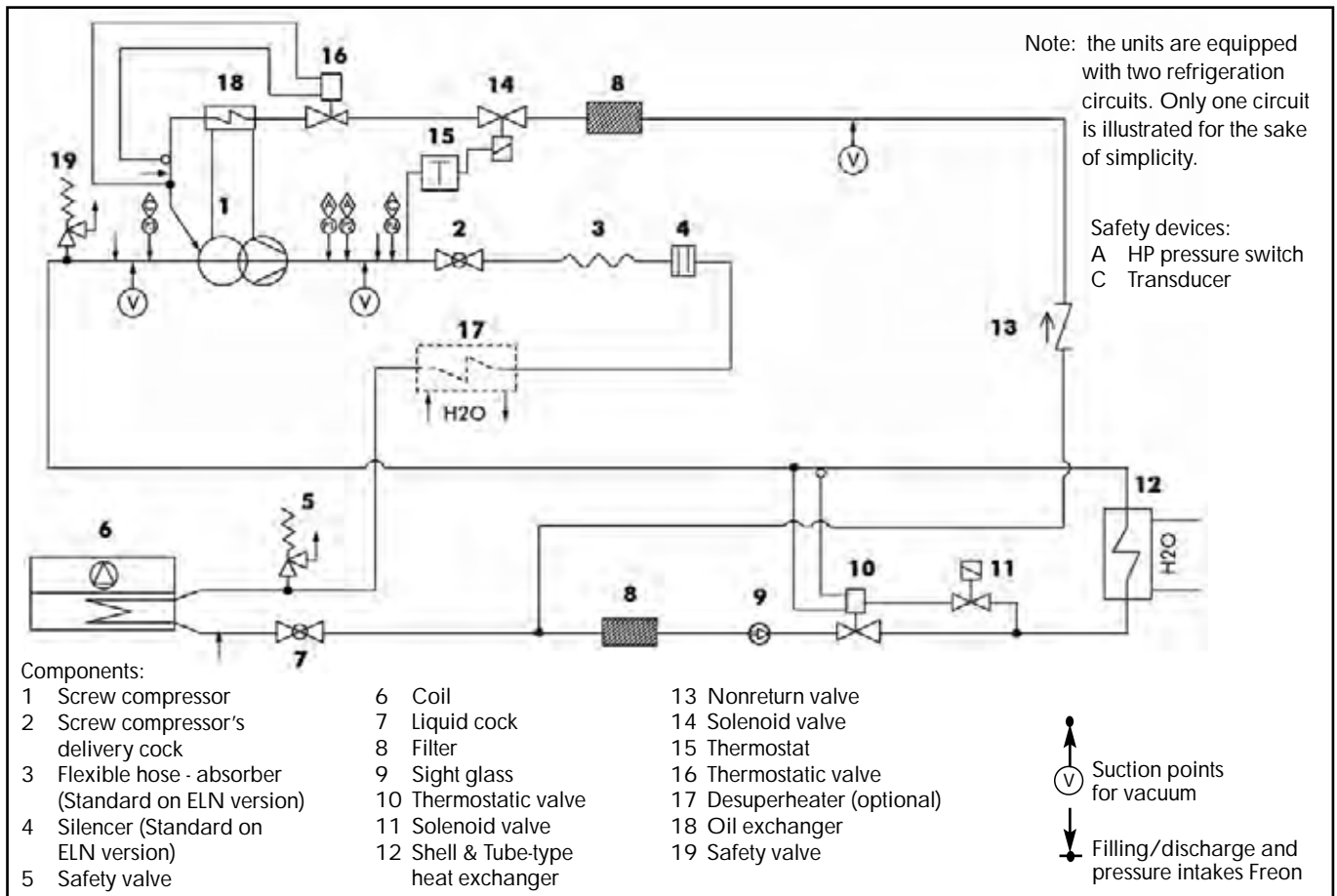
SLS - Refrigerant circuit of units with Shell and Tube evaporator



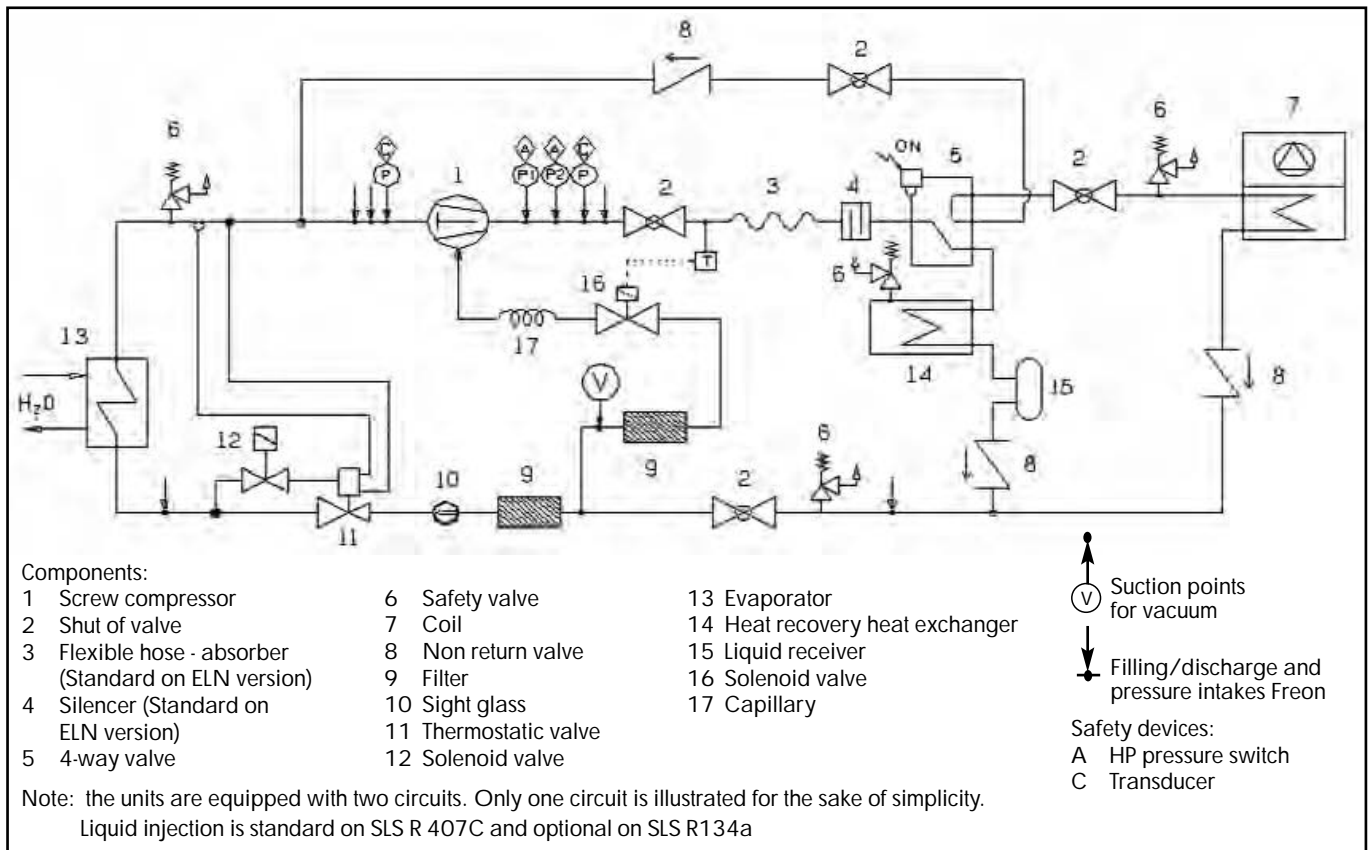
SLS - Refrigerant circuit of units with plate exchanger evaporator and oil cooler



SLS - Refrigerant circuit of units with Shell and Tube evaporator and oil cooler

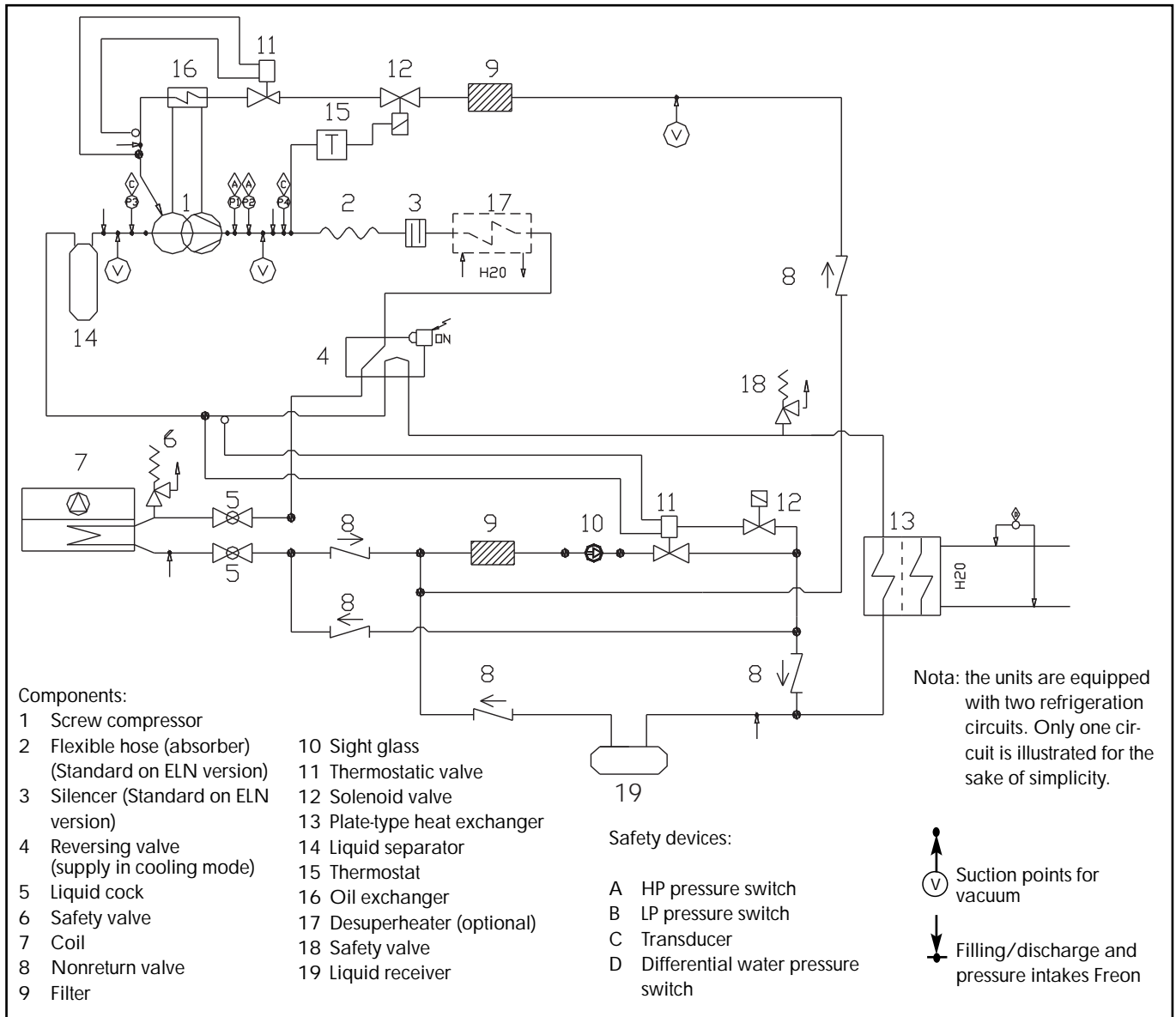


SLS - Refrigerant circuit of units with total heat recovery



General Description

SLH - Refrigeration circuit



7.8 Power supply and control system

All units are provided with a microprocessor and a "Chiller Control" system.

The electrical connection of the controls and the start-up units for the motor are carried out and tested in the factory. The power supply and control components are separate and accessible from different doors.

A door stop disconnecting switch is always available, and is mounted on the door of the appliance, supply side. The cabinet includes also another door, that can be opened from the top, waterproofed according to IP 54 standard.

The power supply compartment includes:

- Master switch
- Network isolator, contactors, compressor fuses

Control panel includes:

- A transformer for auxiliaries, fuses, relay and electronic card, a thermostat for the compressor's delivery temperature
- The keyboard and the display of the "Chiller-Control" microcomputer, mounted on the door of the control section.

General Description

7.9 "Chiller Control"

The "Chiller Control" unit consists of an expandable interface card and a controller.

The function of the expandable interface card is to monitor the inputs and control the outputs:

- Digital inputs, such as alarm and control signals.
- Analog inputs, such as temperature/pressure measuring signals.
- Digital outputs for exciting the control relay and the remote-control switch.

The microprocessor will execute the logic that controls:

- The LED and the display of the alarm signals and the operation of the appliance.
- The compressor's start-up logic (excitation of the winding and stop), potential regulation (3+3 steps).
- The display of the compressor's working hours and the temperature of the water to the evaporator.
- The anti-cycling and delay timing upon start-up.
- The automatic advance/delay sequence for the compressor start-up.
- The fan stop.

Reference and parameter control:

- User level: the operator can modify any data with the 'ENTER', '+' and '-' keys.
- Service level: password protected access by the authorised personnel.

7.10 Accessories

List of the available accessories, supplied separately, to be mounted on-site by the installer:

Flow switch

Prevents the operation of the unit if the circulating chilled fluid is insufficient. It is recommended to install a flow switch to ensure the correct operation of the unit.

Water filter

Filter to be mounted on the suction side of the water heat exchanger.

Remote wall terminal

Makes it possible to control the unit through the remote terminal, up to a maximum distance of 200 meters.

Chiller data logger

Records continuously the essential thermodynamic operating parameters, during the 10 minutes that precede the last alarm.

Modem GSM

Makes it possible to check the working mode or the switching on/off of the unit via SMS. In case of any alarms, the unit sends an SMS to the user.

RS-485 serial card (for MODBUS or LONWORK or BACNET)

A communication interface allows you to control and manage the unit from a local station, with RS485 connection, up to a distance of 1000 m. It is therefore possible to obtain remote control and management by integrating these functions into the building's control system.

External hydronic kit

Hydronic kits consisting of pumps and storage tanks (1,000 to 1,500 litres).

Single Point supply box

This accessory is available for SLS 3804-4004 and SLH 2804-3204-3604-3804 twin units, and makes it possible to obtain only one power supply point.

8 TECHNICAL DATA

8.1 Pressure drops

Evaporator SLS

		SLS 1202	SLS 1402	SLS 1602	SLS 1802	SLS 1902	SLS 2002	SLS 2202	SLS 2402
K	10^{-2} kPa/(l/s) ²	19.3	19.3	13.2	9.8	9.8	9.8	7.2	7.2
Min. water flow rate	l/s	7.8	8.9	10.1	11.3	12.7	13.7	15.2	15.9
Nominal water flow rate	l/s	12.5	14.1	16.2	18.1	20.2	21.9	24.3	25.2
Max. water flow rate	l/s	20.9	23.6	27.0	30.2	33.7	36.5	40.5	42.5
Min. pressure drops	kPa	11.8	15.1	13.6	12.6	15.7	18.3	16.7	18.4
Nominal pressure drops	kPa	30.3	38.7	34.7	32.2	40.1	46.9	42.8	47.2
Max. pressure drops	kPa	84.2	107.4	96.4	89.4	111.5	130.3	118.8	131.0

		SLS 2602	SLS 3002	SLS 3402	SLS 3802	SLS 4202	SLS 3804	SLS 4004
K	10^{-2} kPa/(l/s) ²	6.4	3.9	3.9	3.6	3.6	9.8	9.8
Min. water flow rate	l/s	17.8	19.4	21.4	23.3	26.3	12.6	13.7
Nominal water flow rate	l/s	28.5	31.0	34.2	37.2	42.1	20.2	21.9
Max. water flow rate	l/s	47.4	51.7	57.0	62.1	70.2	33.7	36.5
Min. pressure drops	kPa	20.4	14.6	17.7	19.4	24.9	15.7	18.3
Nominal pressure drops	kPa	52.2	37.4	45.4	49.7	63.6	40.1	46.9
Max. pressure drops	kPa	145.0	103.8	126.2	138.1	176.7	111.4	130.3

Desuperheater SLS

		SLS 1202	SLS 1402	SLS 1602	SLS 1802	SLS 1902
K	10^{-2} kPa/(l/s) ²	575.8	570.3	561.6	263.0	263.0
Min. water flow rate	l/s	1.1	1.2	1.4	1.6	1.7
Nominal water flow rate	l/s	1.7	1.9	2.2	2.5	2.8
Max. water flow rate	l/s	2.9	3.2	3.7	4.2	4.6
Min. pressure drops	kPa	6.8	8.4	11.0	6.5	7.8
Nominal pressure drops	kPa	17.3	21.4	28.1	16.7	19.9
Max. pressure drops	kPa	48.0	59.4	78.1	46.5	55.3

		SLS 2002	SLS 2202	SLS 2402	SLS 2602
K	10^{-2} kPa/(l/s) ²	263.0	211.5	211.5	267.9
Min. water flow rate	l/s	1.9	2.1	2.2	2.4
Nominal water flow rate	l/s	3.0	3.3	3.5	3.9
Max. water flow rate	l/s	5.0	5.5	5.8	6.5
Min. pressure drops	kPa	9.2	9.1	10.1	15.7
Nominal pressure drops	kPa	23.7	23.3	26.0	40.2
Max. pressure drops	kPa	65.7	64.7	72.1	111.6

		SLS 3002	SLS 3402	SLS3802	SLS 4202
K	10^{-2} kPa/(l/s) ²	65.5	56.0	49.3	41.8
Min. water flow rate	l/s	2.4	2.7	3.0	3.4
Nominal water flow rate	l/s	3.9	4.3	4.8	5.5
Max. water flow rate	l/s	6.5	7.2	8.0	9.2
Min. pressure drops	kPa	3.9	4.0	4.4	4.9
Nominal pressure drops	kPa	10.0	10.3	11.2	12.6
Max. pressure drops	kPa	27.9	28.7	31.2	35.1

$$\Delta P = K Q^2$$

Desuperheaters for SLS 3804 site refer to technical data of SLS 1902, for SLS 4004 site refer to technical data of SLS 2202 site.

Total heat recovery condenser SLS

		SLS 1202	SLS 1402	SLS1602	SLS 1802	SLS 1902	SLS 2002	SLS 2202
K	10^{-2} kPa/(l/s) ²	531.4	385.6	385.6	257.9	190.4	190.4	164.7
Min. water flow rate	l/s	5.2	5.8	6.7	7.6	8.3	9.0	10.0
Nominal water flow rate	l/s	8.3	9.3	10.7	12.1	13.2	14.4	15.9
Max. water flow rate	l/s	13.9	15.5	17.9	20.1	22.0	24.0	26.5
Min. pressure drops	kPa	14.3	13.0	17.3	14.7	13.0	15.4	16.3
Nominal pressure drops	kPa	36.7	33.3	44.4	37.7	33.2	39.4	41.8
Max. pressure drops	kPa	101.9	92.5	123.3	104.7	92.3	109.5	116.0

		SLS 2402	SLS 2602	SLS 3002	SLS 3402	SLS 3802	SLS 4202
K	10^{-2} kPa/(l/s) ²	153.4	118.3	118.3	118.3	63.7	63.7
Min. water flow rate	l/s	10.5	11.6	12.7	14.0	15.4	17.5
Nominal water flow rate	l/s	16.8	18.6	20.3	22.4	24.6	28.0
Max. water flow rate	l/s	28.0	31.0	33.9	37.3	41.0	46.6
Min. pressure drops	kPa	16.9	16.0	19.1	23.2	15.1	19.5
Nominal pressure drops	kPa	43.3	40.9	48.9	59.3	38.5	49.9
Max. pressure drops	kPa	120.3	113.5	135.8	164.7	107.1	138.5

Evaporator SLH

		SLH 1202	SLH 1402	SLH 1602	SLH 1802	SLH 1902	SLH 2002	SLH 2202
K	10^{-2} kPa/(l/s) ²	19.3	19.3	13.2	9.8	9.8	9.8	7.2
Min. water flow rate	l/s	7.8	8.7	9.8	10.6	12.0	12.6	13.6
Nominal water flow rate	l/s	12.5	14.0	15.6	16.9	19.2	20.1	21.8
Max. water flow rate	l/s	20.8	23.3	26.0	28.2	31.9	33.5	36.3
Min. pressure drops	kPa	11.7	14.7	12.5	11.0	14.0	15.5	13.4
Nominal pressure drops	kPa	29.9	37.6	32.1	28.1	36.0	39.6	34.4
Max. pressure drops	kPa	83.1	104.6	89.2	78.0	99.9	109.9	95.6

		SLH 2402	SLH 2602	SLH 2804	SLH 3204	SLH 3604	SLH 3804
K	10^{-2} kPa/(l/s) ²	7.2	6.4	19.3	13.2	9.8	9.8
Min. water flow rate	l/s	14.2	15.8	8.7	9.8	10.6	11.6
Nominal water flow rate	l/s	22.7	25.2	14.0	15.6	16.9	18.5
Max. water flow rate	l/s	37.8	42.1	23.3	26.0	28.2	30.9
Min. pressure drops	kPa	14.6	16.0	14.7	12.5	11.0	13.1
Nominal pressure drops	kPa	37.3	41.1	37.8	32.1	28.1	33.6
Max. pressure drops	kPa	103.7	114.1	104.6	89.2	78.0	93.3

Desuperheater SLH

		SLH 1202	SLH 1402	SLH 1602	SLH 1802	SLH 1902
K	10^{-2} kPa/(l/s) ²	575.8	570.3	561.6	263.0	263.0
Min. water flow rate	l/s	1.1	1.2	1.4	1.5	1.6
Nominal water flow rate	l/s	1.7	1.9	2.2	2.3	2.6
Max. water flow rate	l/s	2.9	3.2	3.6	3.9	4.4
Min. pressure drops	kPa	6.8	8.3	10.6	5.7	7.1
Nominal pressure drops	kPa	17.3	21.2	27.0	14.6	18.1
Max. pressure drops	kPa	48.1	58.9	75.1	40.4	50.3

		SLH 2002	SLH 2202	SLH 2402	SLH 2602
K	10^{-2} kPa/(l/s) ²	263.0	211.5	211.5	267.9
Min. water flow rate	l/s	1.7	1.9	2.0	2.2
Nominal water flow rate	l/s	2.8	3.0	3.2	3.5
Max. water flow rate	l/s	4.6	5.0	5.3	5.8
Min. pressure drops	kPa	7.9	7.5	8.2	12.7
Nominal pressure drops	kPa	20.1	19.3	21.0	32.5
Max. pressure drops	kPa	55.9	53.7	58.4	90.3

$$\Delta P = K Q^2$$

Desuperheaters for SLH 2804 site refer to technical data of SLH 1402, for SLH 3204 site refer to technical data of SLH 1602, for SLH 3604 site to technical data of SLH 1802 and for SLH 3804 site refer to technical data of SLH 1802 for one circuit and SLH 2002 for other circuit.

8.2 Technical data

SLS BLN/LN		1202	1402	1602	1802	1902	2002	2202	2402
Nominal voltage	V/ph/Hz	400/3/50							
Number of circuits		2	2	2	2	2	2	2	2
Number of steps		6	6	6	6	6	6	6	6
Capacity steps	%	25	25	25	25	25	25	25	25

Refrigerant

Type		R407C							
Charge (1)	kg	38+38	49+49	45+45	59+59	63+63	59+59	74+74	77+77

Compressors

Type		Screw							
Number		2	2	2	2	2	2	2	2
Start-up type		Part-Winding						Y/Δ	

Evaporator

Type		Plate type							
Number		1	1	1	1	1	1	1	1
Minimum water content	l	26	26	33	40	40	40	50	50

Hydraulic connections

Type		Gas threaded male type							
Inlet diameter	inch	3"	3"	3"	3"	3"	3"	3"	3"
Outlet diameter	inch	3"	3"	3"	3"	3"	3"	3"	3"

Desuperheater (2)

Type		Plate type							
Number		2	2	2	2	2	2	2	2
Minimum water content	l	2	2	2	3	3	3	3	3

Hydraulic connections

Type		Gas threaded male type							
Inlet diameter	inch	2"	2"	2"	2"	2"	2"	2"	2"
Outlet diameter	inch	2"	2"	2"	2"	2"	2"	2"	2"

Condenser

Type		Coil type (Al/Cu)							
------	--	-------------------	--	--	--	--	--	--	--

Weights

Shipping	kg	3430	3850	3890	3960	4390	4760	5480	5840
Operating	kg	3456	3876	3923	4000	4430	4800	5530	5890

Dimensions

Length	mm	4030	4030	4030	4030	4030	4030	6030	6030
Width	mm	2200	2200	2200	2200	2200	2200	2200	2200
Height	mm	2550	2550	2550	2550	2550	2550	2550	2550

(1) Indicative value. Always refer to the value specified on the unit's label.

(2) Available as optional

Technical data

SLS BLN/LN		2602	3002	3402	3802	4202	3804	4004
Nominal voltage	V/ph/Hz	400/3/50						
Number of circuits		2	2	2	2	2	4	4
Number of steps		6	6	6	6	6	12	12
Capacity steps	%	25	25	25	25	25	12.5	12.5

Refrigerant

Type		R407C						
Charge (1)	kg	74+74	78+78	82+82	88+88	92+92	59+59/59+59	63+63/63+63

Compressors

Type		Screw						
Number		2	2	2	2	2	4	4
Start-up type		Y/Δ					Part-Winding	

Evaporator

Type		Plate type	Shell & Tube				Plate type	
Number		1	1	1	1	1	2	2
Minimum water content	l	50	207	222	222	222	40	40

Hydraulic connections

Type		Gas thre. male	To be welded				Gas threaded male type	
Inlet diameter	inch	3"	8"	8"	8"	8"	3"	3"
Outlet diameter	inch	3"	8"	8"	8"	8"	3"	3"

Desuperheater (2)

Type		Plate type						
Number		2	2	2	2	2	4	4
Minimum water content	l	3	3	4	4	4	3	3

Hydraulic connections

Type		Gas threaded male type						
Inlet diameter	inch	2"	2"	2"	2"	2"	2"	2"
Outlet diameter	inch	2"	2"	2"	2"	2"	2"	2"

Condenser

Type		Coil type (Al/Cu)						
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Weights

Shipping	kg	6110	6470	6610	8740	8850	8780	9520
Operating	kg	6160	6677	6817	8962	9072	8860	9600

Dimensions

Length	mm	6030	6030	6030	8040	8040	8070	8070
Width	mm	2200	2200	2200	2200	2200	2200	2200
Height	mm	2550	2550	2550	2550	2550	2550	2550

(1) Indicative value. Always refer to the value specified on the unit's label.

(2) Available as optional

SLS ELN/HET		1202	1402	1602	1802	1902	2002	2202	2402
Nominal voltage	V/ph/Hz	400/3/50							
Number of circuits		2	2	2	2	2	2	2	2
Number of steps		6	6	6	6	6	6	6	6
Capacity steps	%	25	25	25	25	25	25	25	25

Refrigerant

Type		R407C							
Charge (1)	kg	41+41	47+47	55+55	63+63	67+67	73+73	77+77	81+81

Compressors

Type		Screw							
Number		2	2	2	2	2	2	2	2
Start-up type		Part-Winding						Y/Δ	

Evaporator

Type		Plate type							
Number		1	1	1	1	1	1	1	1
Minimum water content	l	26	26	33	40	40	40	50	50

Hydraulic connections

Type		Gas threaded male type							
Inlet diameter	inch	3"	3"	3"	3"	3"	3"	3"	3"
Outlet diameter	inch	3"	3"	3"	3"	3"	3"	3"	3"

Desuperheater (2)

Type		Plate type							
Number		2	2	2	2	2	2	2	2
Minimum water content	l	2	2	2	3	3	3	3	3

Hydraulic connections

Type		Gas threaded male type							
Inlet diameter	inch	2"	2"	2"	2"	2"	2"	2"	2"
Outlet diameter	inch	2"	2"	2"	2"	2"	2"	2"	2"

Condenser

Tipo		Coil type (Al/Cu)							
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Weights

Shipping	kg	3500	4050	4160	4160	5320	5770	5730	6160
Operating	kg	3526	4076	4193	4200	5360	5810	5780	6210

Dimensions

Length	mm	4030	4030	4030	4030	6030	6030	6030	6030
Width	mm	2200	2200	2200	2200	2200	2200	2200	2200
Height	mm	2550	2550	2550	2550	2550	2550	2550	2550

(1) Indicative value. Always refer to the value specified on the unit's label.

(2) Available as optional

Technical data

SLS ELN/HET		2602	3002	3402	3802	4202	3804	4004
Nominal voltage	V/ph/Hz	400/3/50						
Number of circuits		2	2	2	2	2	4	4
Number of steps		6	6	6	6	6	12	12
Capacity steps	%	25	25	25	25	25	12.5	12.5

Refrigerant

Type		R407C						
Charge (1)	kg	86+86	91+91	96+96	103+103	109+109	67+67/67+67	73+73/73+73

Compressors

Type		Screw						
Number		2	2	2	2	2	4	4
Start-up type		Y/Δ					Part-Winding	

Evaporator

Type		Plate type	Shell & Tube				Plate type	
Number		1	1	1	1	1	2	2
Minimum water content	l	50	207	207	222	222	40	40

Hydraulic connections

Type		Gas thre. male	To be welded				Gas threaded male type	
Inlet diameter	inch	3"	8"	8"	8"	8"	3"	3"
Outlet diameter	inch	3"	8"	8"	8"	8"	3"	3"

Desuperheater (2)

Type		Plate type						
Number		2	2	2	2	2	4	4
Minimum water content	l	3	3	4	4	4	3	3

Hydraulic connections

Type		Gas threaded male type						
Inlet diameter	inch	2"	2"	2"	2"	2"	2"	2"
Outlet diameter	inch	2"	2"	2"	2"	2"	2"	2"

Condenser

Type		Coil type (Al/Cu)						
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Weights

Shipping	kg	6390	6750	6820	9260	9380	9230	9970
Operating	kg	6440	6957	7027	9482	9602	9310	10050

Dimensions

Length	mm	6030	6030	6030	8040	8040	8070	8070
Width	mm	2200	2200	2200	2200	2200	2200	2200
Height	mm	2550	2550	2550	2550	2550	2550	2550

(1) Indicative value. Always refer to the value specified on the unit's label.

(2) Available as optional

SLS-R BLN/LN		1202	1402	1602	1802	1902	2002	2202
Nominal voltage	V/ph/Hz	400/3/50						
Number of circuits		2	2	2	2	2	2	2
Number of steps		6	6	6	6	6	6	6
Capacity steps	%	25	25	25	25	25	25	25

Refrigerant

Type		R407C						
Charge (1)	kg	38+38	43+43	49+49	56+56	59+59	63+63	67+67

Compressors

Type		Screw						
Number		2	2	2	2	2	2	2
Start-up type		Part-Winding						Y/Δ

Evaporator

Type		Plate type						
Number		1	1	1	1	1	2	2
Minimum water content	l	26	26	33	33	40	40	40

Hydraulic connections

Type		Gas threaded male type						
Inlet diameter	inch	3"	3"	3"	3"	3"	3"	3"
Outlet diameter	inch	3"	3"	3"	3"	3"	3"	3"

Total heat recovery condenser

Type		Plate type						Shell & tube
Number		2	2	2	2	2	2	2
Minimum water content	l	15	19	19	23	25	25	32

Hydraulic connections

Type		Gas threaded male type						Gas thre. female
Inlet diameter	inch	2"	2"	2"	3"	3"	3"	3"
Outlet diameter	inch	2"	2"	2"	3"	3"	3"	3"

Condenser

Type		Coil type (Al/Cu)						
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Weights

Shipping	kg	3530	3970	4000	4290	4740	5110	6040
Operating	kg	3590	4030	4070	4370	4830	5200	6150

Dimensions

Length	mm	4030	4030	4030	4030	4030	4030	6030
Width	mm	2200	2200	2200	2200	2200	2200	2200
Height	mm	2550	2550	2550	2550	2550	2550	2550

(1) Indicative value. Always refer to the value specified on the unit's label.

(2) Available as optional

Technical data

SLS-R BLN/LN		2402	2602	3002	3402	4802	4202
Nominal voltage	V/ph/Hz	400/3/50					
Number of circuits		2	2	2	2	2	2
Number of steps		6	6	6	6	6	6
Capacity steps	%	25	25	25	25	25	25

Refrigerant

Type		R407C					
Charge (1)	kg	70+70	74+74	78+78	82+82	88+88	92+92

Compressors

Type		Screw					
Number		2	2	2	2	2	2
Start-up type		Y/Δ					

Evaporator

Type		Plate type		Shell & tube			
Number		1	1	1	1	1	2
Minimum water content	l	50	50	207	207	222	222

Hydraulic connections

Type		Gas threaded male		To be welded			
Inlet diameter	inch	3"	3"	8"	8"	8"	8"
Outlet diameter	inch	3"	3"	8"	8"	8"	8"

Total heat recovery condenser

Type		Shell & tube					
Number		2	2	2	2	2	2
Minimum water content	l	34	36	36	36	48	48

Hydraulic connections

Type		Gas threaded female type					
Inlet diameter	inch	3"	3"	3"	3"	4"	4"
Outlet diameter	inch	3"	3"	3"	3"	4"	4"

Condenser

Type		Coil type (Al/Cu)					
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Weights

Shipping	kg	6410	6690	7060	7240	9490	9600
Operating	kg	6530	6820	7330	7500	9810	9920

Dimensions

Length	mm	6030	6030	6030	6030	8040	8040
Width	mm	2200	2200	2200	2200	2200	2200
Height	mm	2550	2550	2550	2550	2550	2550

(1) Indicative value. Always refer to the value specified on the unit's label.

SLS-R ELN/HET		1202	1402	1602	1802	1902	2002	2202
Nominal voltage	V/ph/Hz	400/3/50						
Number of circuits		2	2	2	2	2	2	2
Number of steps		6	6	6	6	6	6	6
Capacity steps	%	25	25	25	25	25	25	25

Refrigerant

Type		R407C						
Charge (1)	kg	41+41	47+47	55+55	63+63	67+67	73+73	77+77

Compressors

Type		Screw						
Number		2	2	2	2	2	2	2
Start-up type		Part-Winding						Y/Δ

Evaporator

Type		Plate type						
Number		1	1	1	1	1	2	2
Minimum water content	l	26	26	33	40	40	40	50

Hydraulic connections

Type		Gas threaded male type						
Inlet diameter	inch	3"	3"	3"	3"	3"	3"	3"
Outlet diameter	inch	3"	3"	3"	3"	3"	3"	3"

Total heat recovery condenser

Type		Plate type						Shell & tube
Number		2	2	2	2	2	2	2
Minimum water content	l	15	19	19	23	25	25	32

Hydraulic connections

Type		Gas threaded male type						Gas thre. female
Inlet diameter	inch	2"	2"	2"	3"	3"	3"	3"
Outlet diameter	inch	2"	2"	2"	3"	3"	3"	3"

Condenser

Type		Coil type (Al/Cu)						
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Weights

Shipping	kg	3530	3970	4000	4290	4740	5110	6040
Operating	kg	3590	4030	4070	4370	4830	5200	6150

Dimensions

Length	mm	4030	4030	4030	4030	4030	4030	6030
Width	mm	2200	2200	2200	2200	2200	2200	2200
Height	mm	2550	2550	2550	2550	2550	2550	2550

(1) Indicative value. Always refer to the value specified on the unit's label.

Technical data

SLS-R ELN/HET		2402	2602	3002	3402	4802	4202
Nominal voltage	V/ph/Hz	400/3/50					
Number of circuits		2	2	2	2	2	2
Number of steps		6	6	6	6	6	6
Capacity steps	%	25	25	25	25	25	25

Refrigerant

Type		R407C					
Charge (1)	kg	81+81	86+86	91+91	96+96	103+103	109+109

Compressors

Type		Screw					
Number		2	2	2	2	2	2
Start-up type		Y/Δ					

Evaporator

Type		Plate type		Shell & tube			
Number		1	1	1	1	1	2
Minimum water content	l	50	50	207	207	222	222

Hydraulic connections

Type		Gas threaded male		To be welded			
Inlet diameter	inch	3"	3"	8"	8"	8"	8"
Outlet diameter	inch	3"	3"	8"	8"	8"	8"

Total heat recovery condenser

Type		Shell & tube					
Number		2	2	2	2	2	2
Minimum water content	l	34	36	36	36	48	48

Hydraulic connections

Type		Gas threaded female type					
Inlet diameter	inch	3"	3"	3"	3"	4"	4"
Outlet diameter	inch	3"	3"	3"	3"	4"	4"

Condenser

Type		Coil type (Al/Cu)					
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Weights

Shipping	kg	6410	6690	7060	7240	9490	9600
Operating	kg	6530	6820	7330	7500	9810	9920

Dimensions

Length	mm	6030	6030	6030	6030	8040	8040
Width	mm	2200	2200	2200	2200	2200	2200
Height	mm	2550	2550	2550	2550	2550	2550

(1) Indicative value. Always refer to the value specified on the unit's label.

SLH BLN/LN		1202	1402	1602	1802	1902	2002	2202
Nominal voltage	V/ph/Hz	400/3/50						
Number of circuits		2	2	2	2	2	2	2
Number of steps		6	6	6	6	6	6	6
Capacity steps	%	25	25	25	25	25	25	25

Refrigerant

Type		R407C						
Charge (1)	kg	41+41	50+50	50+50	66+66	70+70	83+83	90+90

Compressors

Type		Screw						
Number		2	2	2	2	2	2	2
Start-up type		Part-Winding						Y/Δ

Evaporator

Type		Plate type						
Number		1	1	1	1	1	2	2
Minimum water content	l	26	26	33	40	40	40	50

Hydraulic connections

Type		Gas threaded male type						
Inlet diameter	inch	3"	3"	3"	3"	3"	3"	3"
Outlet diameter	inch	3"	3"	3"	3"	3"	3"	3"

Desuperheater (2)

Type		Plate type						
Number		2	2	2	2	2	2	2
Minimum water content	l	2	2	2	2	3	3	3

Hydraulic connections

Type		Gas threaded male type						
Inlet diameter	inch	2"	2"	2"	2"	2"	2"	2"
Outlet diameter	inch	2"	2"	2"	2"	2"	2"	2"

Condenser

Type		Coil type (Al/Cu)						
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Weights

Shipping	kg	3540	3960	4000	4075	4510	4880	5600
Operating	kg	3542	3962	4002	4077	4512	4882	5602

Dimensions

Length	mm	4030	4030	4030	4030	4030	4030	6030
Width	mm	2200	2200	2200	2200	2200	2200	2200
Height	mm	2550	2550	2550	2550	2550	2550	2550

(1) Indicative value. Always refer to the value specified on the unit's label.

(2) Available as optional

Technical data

SLH BLN/LN		2402	2602	2804	3204	3604	3804
Nominal voltage	V/ph/Hz	400/3/50					
Number of circuits		2	2	4	4	4	4
Number of steps		6	6	12	12	12	12
Capacity steps	%	25	25	12.5	12.5	12.5	12.5

Refrigerant

Type		R407C					
Charge BLN (1)	kg	104+404	120+120	47+47/47+47	53+53/53+53	66+66/66+66	74+74/74+74

Compressors

Type		Screw					
Number		2	2	4	4	4	4
Start-up type		Y/Δ		Part-Winding			

Evaporator

Type		Plate type					
Number		1	1	2	2	2	2
Minimum water content	l	50	50	26	33	40	40

Hydraulic connections

Type		Gas threaded male					
Inlet diameter	inch	3"	3"	3"	3"	3"	3"
Outlet diameter	inch	3"	3"	3"	3"	3"	3"

Desuperheater (2)

Type		Plate type					
Number		2	2	4	4	4	4
Minimum water content	l	3	3	2	2	3	3

Hydraulic connections

Type		Gas threaded female type					
Inlet diameter	inch	2"	2"	2"	2"	2"	2"
Outlet diameter	inch	2"	2"	2"	2"	2"	2"

Condenser

Type		Coil type (Al/Cu)					
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Weights

Shipping	kg	5960	6230	7920	8000	8150	8955
Operating	kg	6010	6280	7972	8066	8230	9035

Dimensions

Length	mm	6030	6030	8405	8405	8405	8405
Width	mm	2200	2200	2200	2200	2200	2200
Height	mm	2550	2550	2550	2550	2550	2550

(1) Indicative value. Always refer to the value specified on the unit's label.

(2) Available as optional

SLH ELN/HET		1202	1402	1602	1802	1902	2002	2202
Nominal voltage	V/ph/Hz	400/3/50						
Number of circuits		2	2	2	2	2	2	2
Number of steps		6	6	6	6	6	6	6
Capacity steps	%	25	25	25	25	25	25	25

Refrigerant

Type		R407C						
Charge (1)	kg	41+41	47+47	52+52	66+66	74+74	83+83	90+90

Compressors

Type		Screw						
Number		2	2	2	2	2	2	2
Start-up type		Part-Winding						Y/Δ

Evaporator

Type		Plate type						
Number		1	1	1	1	1	2	2
Minimum water content	l	26	26	33	40	40	40	50

Hydraulic connections

Type		Gas threaded male type						
Inlet diameter	inch	3"	3"	3"	3"	3"	3"	3"
Outlet diameter	inch	3"	3"	3"	3"	3"	3"	3"

Desuperheater (2)

Type		Plate type						
Number		2	2	2	2	2	2	2
Minimum water content	l	2	2	2	3	3	3	3

Hydraulic connections

Type		Gas threaded male type						
Inlet diameter	inch	2"	2"	2"	2"	2"	2"	2"
Outlet diameter	inch	2"	2"	2"	2"	2"	2"	2"

Condenser

Type		Coil type (Al/Cu)						
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Weights

Shipping	kg	3610	4160	4270	4280	5440	5880	5850
Operating	kg	3612	4162	4272	4282	5442	5882	5852

Dimensions

Length	mm	4030	4030	4030	4030	6030	6030	6030
Width	mm	2200	2200	2200	2200	2200	2200	2200
Height	mm	2550	2550	2550	2550	2550	2550	2550

(1) Indicative value. Always refer to the value specified on the unit's label.

(2) Available as optional

Technical data

SLH ELN/HET		2402	2602	2804	3204	3604	3804
Nominal voltage	V/ph/Hz	400/3/50					
Number of circuits		2	2	4	4	4	4
Number of steps		6	6	12	12	12	12
Capacity steps	%	25	25	12.5	12.5	12.5	12.5

Refrigerant

Type		R407C					
Charge (1)	kg	104+404	120+120	47+47/47+47	53+53/53+53	66+66/66+66	74+74/74+74

Compressors

Type		Screw					
Number		2	2	4	4	4	4
Start-up type		Y/Δ		Part-Winding			

Evaporator

Type		Plate type					
Number		1	1	2	2	2	2
Minimum water content	l	50	50	26	33	40	40

Hydraulic connections

Type		Gas threaded male type					
Inlet diameter	inch	3"	3"	3"	3"	3"	3"
Outlet diameter	inch	3"	3"	3"	3"	3"	3"

Desuperheater (2)

Type		Plate type					
Number		2	2	4	4	4	4
Minimum water content	l	3	3	2	2	3	3

Hydraulic connections

Type		Gas threaded male type					
Inlet diameter	inch	2"	2"	2"	2"	2"	2"
Outlet diameter	inch	2"	2"	2"	2"	2"	2"

Condenser

Type		Coil type (Al/Cu)					
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Weights

Shipping	kg	6280	6510	8320	8540	8560	9380
Operating	kg	6330	6560	8373	8606	8640	9460

Dimensions

Length	mm	6030	6030	8405	8405	8405	8405
Width	mm	2200	2200	2200	2200	2200	2200
Height	mm	2550	2550	2550	2550	2550	2550

(1) Indicative value. Always refer to the value specified on the unit's label.

(2) Available as optional

8.3 Electrical data

SLS BLN/LN		1202	1402	1602	1802	1902	2002	2202	2402
Nominal voltage	V(%)·ph·Hz	400 ±10% / 3 / 50							
Nominal power input	kW	106	126	142	166	173	190	205	220
Max power input	kW	125	147	167	208	203	236	241	280
Nominal current	A	191	227	256	300	312	342	370	396
Max. current (FLA)	A	208	272	304	356	368	392	424	464
Max. start-up current (LRA)	A	456	391	473	568	645	678	445	497
External fuses	(A)	315	315	315	400	400	400	500	500
Wire cross area (1)	mm ²	240	240	240	2x120	2x120	2x120	2x150	2x150

SLS BLN/LN		2602	3002	3402	3802	4202	3804	4004
Nominal voltage	V(%)·ph·Hz	400 ±10% / 3 / 50						
Nominal power input	kW	239	266	293	317	381	173+173	190+190
Max power input	kW	281	313	341	434	520	203+203	236+236
Nominal current	A	429	480	528	552	663	312+312	331+331
Max. current (FLA)	A	482	530	588	708	796	368+368	392+392
Max. start-up current (LRA)	A	544	586	690	744	901	912	962
External fuses	(A)	630	630	630	800	1000	400+400	400+400
Wire cross area (1)	mm ²	2x185	2x185	2x185	2x300	2x300	2x120+2x120	2x120+2x120

(1) The dimensioning of the unit's power cables is the responsibility of the installer, who shall consider: the rating, the maximum working temperature in the room, the type of insulation and the cable laying, the maximum length of the power supply line.

SLS ELN		1202	1402	1602	1802	1902	2002	2202	2402
Nominal voltage	V(%)·ph·Hz	400 ±10% / 3 / 50							
Nominal power input	kW	106	121	140	160	167	187	199	217
Max power input	kW	124	143	165	202	197	233	235	277
Nominal current	A	189	217	251	286	299	333	356	387
Max. current (FLA)	A	206	262	298	342	354	383	410	455
Max. start-up current (LRA)	A	454	381	467	555	631	669	432	488
External fuses	(A)	315	315	315	400	400	400	500	500
Wire cross area (1)	mm ²	240	240	240	2x120	2x120	2x120	2x150	2x150

SLS ELN		2602	3002	3402	3802	4202	3804	4004
Nominal voltage	V(%)·ph·Hz	400 ±10% / 3 / 50						
Nominal power input	kW	235	261	269	311	373	167+167	184+184
Max power input	kW	277	308	332	428	512	197+197	230+230
Nominal current	A	420	467	508	536	644	299+299	318+318
Max. current (FLA)	A	473	518	568	692	777	354+354	378+378
Max. start-up current (LRA)	A	535	573	670	728	882	885	935
External fuses	(A)	630	630	630	800	1000	400+400	400+400
Wire cross area (1)	mm ²	2x185	2x185	2x185	2x300	2x300	2x120+2x120	2x120+2x120

(1) The dimensioning of the unit's power cables is the responsibility of the installer, who shall consider: the rating, the maximum working temperature in the room, the type of insulation and the cable laying, the maximum length of the power supply line.

Technical data

Unit Electrical Data

SLS HET		1202	1402	1602	1802	1902	2002	2202	2402
Nominal voltage	V(%)·ph-Hz	400 ±10% / 3 / 50							
Nominal power input	kW	110	126	146	173	173	194	205	224
Max power input	kW	129	147	171	203	203	240	241	284
Nominal current	A	199	227	264	312	312	350	370	404
Max. current (FLA)	A	216	272	312	368	368	400	424	472
Max. start-up current (LRA)	A	464	391	481	645	645	686	445	505
External fuses	(A)	315	315	315	400	400	500	500	500
Wire cross area (1)	mm ²	240	240	240	2x120	2x120	2x150	2x150	2x150

SLS HET		2602	3002	3402	3802	4202	3804	4004	
Nominal voltage	V(%)·ph-Hz	400 ±10% / 3 / 50							
Nominal power input	kW	243	270	293	321	385	173+173	194+194	
Max power input	kW	285	317	341	438	524	203+203	240+240	
Nominal current	A	437	488	528	560	671	312+312	350+350	
Max. current (FLA)	A	490	538	588	716	804	368+368	400+400	
Max. start-up current (LRA)	A	552	594	690	752	909	912	962	
External fuses	(A)	630	630	630	800	1000	400+400	500+500	
Wire cross area (1)	mm ²	2x185	2x185	2x185	2x300	2x300	2x120+2x120	2x120+2x120	

(1) The dimensioning of the unit's power cables is the responsibility of the installer, who shall consider: the rating, the maximum working temperature in the room, the type of insulation and the cable laying, the maximum length of the power supply line.

Compressors Electrical Data

Compressors SLS		1202	1402	1602	1802	1902	2002	2202	2402
Number	n°	2	2	2	2	2	2	2	2
Nominal power input	kW	2x49	2x57	2x65	2x75	2x79	2x87	2x95	2x102
Max power input	kW	2x58	2x68	2x77	2x96	2x94	2x110	2x113	2x132
Nominal current	A	2x87	2x102	2x116	2x134	2x140	2x155	2x169	2x182
Max. current (FLA)	A	2x96	2x124	2x140	2x162	2x168	2x180	2x196	2x216
Max. start-up current (LRA)	A	2x373	2x280	2x351	2x423	2x495	2x520	2x276	2x314
Oil treater power input	W	200	200	200	200	200	300	200	300

Compressors SLS		2602	3002	3402	3802	4202	3804	4004
Number	n°	2	2	2	2	2	4	4
Nominal power input	kW	2x111	2x123	2x135	2x147	2x177	4x79	4x87
Max power input	kW	2x132	2x147	2x158	2x205	2x246	4x94	4x110
Nominal current	A	2x199	2x220	2x240	2x252	2x304	4x140	4x150
Max. current (FLA)	A	2x225	2x245	2x270	2x330	2x370	4x168	4x180
Max. start-up current (LRA)	A	2x354	2x374	2x453	2x465	2x586	4x495	4x520
Oil treater power input	W	275	275	275	300	300	200	300

Fans Electrical Data

Standard fans SLS BLN/LN		1202	1402	1602	1802	1902	2002	2202	2402
Power supply	V-ph-Hz	400 ±10% / 3 / 50							
Number	n°	4	6	6	8	8	8	8	8
Rated power per fan	kW	2	2	2	2	2	2	2	2
Max. absorbed current per fan	A	4	4	4	4	4	4	4	4

Standard fans SLS BLN/LN		2602	3002	3402	3802	4202	3804	4004
Power supply	V-ph-Hz	400 ±10% / 3 / 50						
Number	n°	8	10	12	12	14	16	16
Rated power per fan	kW	2	2	2	2	2	2	2
Max. absorbed current per fan	A	4	4	4	4	4	4	4

Standard fans SLS ELN		1202	1402	1602	1802	1902	2002	2202	2402
Power supply	V-ph-Hz	400 ±10% / 3 / 50							
Number	n°	6	6	8	8	8	10	8	10
Rated power per fan	kW	1,25	1,25	1,25	1,25	1,25	1,25	1,25	1,25
Max. absorbed current per fan	A	2,3	2,3	2,3	2,3	2,3	2,3	2,3	2,3

Standard fans SLS ELN		2602	3002	3402	3802	4202	3804	4004
Power supply	V-ph-Hz	400 ±10% / 3 / 50						
Number	n°	10	12	12	14	16	16	16
Rated power per fan	kW	1,25	1,25	1,25	1,25	1,25	1,25	1,25
Max. absorbed current per fan	A	2,3	2,3	2,3	2,3	2,3	2,3	2,3

Standard fans SLS HET		1202	1402	1602	1802	1902	2002	2202	2402
Power supply	V-ph-Hz	400 ±10% / 3 / 50							
Number	n°	6	6	8	8	8	10	8	10
Rated power per fan	kW	2	2	2	2	2	2	2	2
Max. absorbed current per fan	A	4	4	4	4	4	4	4	4

Standard fans SLS HET		2602	3002	3402	3802	4202	3804	4004
Power supply	V-ph-Hz	400 ±10% / 3 / 50						
Number	n°	10	12	12	14	16	16	16
Rated power per fan	kW	2	2	2	2	2	2	2
Max. absorbed current per fan	A	4	4	4	4	4	4	4

Technical data

Unit Electrical Data

SLH BLN/LN		1202	1402	1602	1802	1902	2002	2202
Nominal voltage	V(%)·ph-Hz	400 ±10% / 3 / 50						
Nominal power input	kW	106	126	142	166	173	190	205
Max power input	kW	125	147	167	208	203	236	241
Nominal current	A	191	227	256	290	312	331	370
Max. current (FLA)	A	208	272	304	356	368	392	424
Max. start-up current (LRA)	A	456	391	473	568	645	678	445
External fuses	(A)	315	315	315	400	400	400	500
Wire cross area (1)	mm ²	240	240	240	2x120	2x120	2x120	2x150

SLH BLN/LN		2402	2602	2804	3204	3604	3804
Nominal voltage	V(%)·ph-Hz	400 ±10% / 3 / 50					
Nominal power input	kW	220	239	126+126	142+142	166+166	190+166
Max power input	kW	280	281	147+147	167+167	208+208	236+208
Nominal current	A	383	429	227+227	256+256	290+290	331+290
Max. current (FLA)	A	464	482	272+272	304+304	356+356	392+356
Max. start-up current (LRA)	A	497	544	588	693	827	937
External fuses	(A)	500	630	315+315	315+315	400+400	500+400
Wire cross area (1)	mm ²	2x150	2x185	2x240	2x240	2x120+2x120	2x150+2x120

(1) The dimensioning of the unit's power cables is the responsibility of the installer, who shall consider: the rating, the maximum working temperature in the room, the type of insulation and the cable laying, the maximum length of the power supply line.

SLH ELN		1202	1402	1602	1802	1902	2002	2202
Nominal voltage	V(%)·ph-Hz	400 ±10% / 3 / 50						
Nominal power input	kW	106	121	140	160	167	187	199
Max power input	kW	124	143	165	202	197	233	235
Nominal current	A	189	217	251	276	299	322	356
Max. current (FLA)	A	206	262	298	342	354	383	410
Max. start-up current (LRA)	A	454	381	467	555	631	669	432
External fuses	(A)	315	315	315	400	400	400	500
Wire cross area (1)	mm ²	240	240	240	2x120	2x120	2x120	2x150

SLH ELN		2402	2602	2804	3204	3604	3804
Nominal voltage	V(%)·ph-Hz	400 ±10% / 3 / 50					
Nominal power input	kW	217	235	121+121	140+140	160+160	184+160
Max power input	kW	277	277	143+143	165+165	202+202	230+202
Nominal current	A	374	420	217+217	251+251	276+276	318+276
Max. current (FLA)	A	455	473	262+262	298+298	342+342	378+342
Max. start-up current (LRA)	A	488	535	568	682	800	910
External fuses	(A)	500	630	315+315	315+315	400+400	500+400
Wire cross area (1)	mm ²	2x150	2x185	2x240	2x240	2x120+2x120	2x150+2x120

(1) The dimensioning of the unit's power cables is the responsibility of the installer, who shall consider: the rating, the maximum working temperature in the room, the type of insulation and the cable laying, the maximum length of the power supply line.

Unit Electrical Data

SLH HET		1202	1402	1602	1802	1902	2002	2202
Nominal voltage	V(%)·ph-Hz	400 ±10% / 3 / 50						
Nominal power input	kW	110	126	146	166	173	194	205
Max power input	kW	129	147	171	208	203	240	241
Nominal current	A	199	227	264	290	312	339	370
Max. current (FLA)	A	216	272	312	356	368	400	424
Max. start-up current (LRA)	A	464	391	481	568	645	686	445
External fuses	(A)	315	315	315	400	400	500	500
Wire cross area (1)	mm ²	240	240	240	2x120	2x120	2x150	2x150

SLH HET		2402	2602	2804	3204	3604	3804
Nominal voltage	V(%)·ph-Hz	400 ±10% / 3 / 50					
Nominal power input	kW	224	243	126+126	146+146	173+173	194+194
Max power input	kW	284	285	147+147	171+171	203+203	240+240
Nominal current	A	391	437	227+227	264+264	312+312	350+250
Max. current (FLA)	A	472	490	272+272	312+312	368+368	400+400
Max. start-up current (LRA)	A	505	552	588	709	827	937
External fuses	(A)	500	630	2x315	315+315	400+400	500+400
Wire cross area (1)	mm ²	2x150	2x185	2x240	2x240	2x120+2x120	2x150+2x120

(1) The dimensioning of the unit's power cables is the responsibility of the installer, who shall consider: the rating, the maximum working temperature in the room, the type of insulation and the cable laying, the maximum length of the power supply line.

Compressors Electrical Data

Compressors SLH		1202	1402	1602	1802	1902	2002	2202
Number	n°	2	2	2	2	2	2	2
Nominal power input	kW	2x49	2x57	2x65	2x75	2x79	2x87	2x95
Max power input	kW	2x58	2x68	2x77	2x96	2x94	2x110	2x113
Nominal current	A	2x87	2x102	2x116	2x129	2x140	2x150	2x169
Max. current (FLA)	A	2x96	2x124	2x140	2x162	2x168	2x180	2x196
Max. start-up current (LRA)	A	2x373	2x280	2x351	2x423	2x495	2x520	2x276
Oil treater power input	W	200	200	200	200	200	300	200

Compressors SLH		2402	2602	2804	3204	3604	3804
Number	n°	2	2	4	4	4	4
Nominal power input	kW	2x102	2x111	4x57	4x65	4x75	2x75+2x87
Max power input	kW	2x132	2x132	4x68	4x77	4x96	2x96+2x110
Nominal current	A	2x175	2x199	4x102	4x116	4x129	2x129+2x150
Max. current (FLA)	A	2x216	2x225	4x124	4x140	4x162	2x162+2x180
Max. start-up current (LRA)	A	2x314	2x354	4x280	4x351	4x423	2x423+2x520
Oil treater power input	W	300	275	200	200	200	300/200

Technical data

Fans Electrical Data

Standard fans SLH BLN/LN		1202	1402	1602	1802	1902	2002	2202
Power supply	V-ph-Hz	400 ±10% / 3 / 50						
Number	n°	4	6	6	8	8	8	8
Rated power per fan	kW	2	2	2	2	2	2	2
Max. absorbed current per fan	A	4	4	4	4	4	4	4

Standard fans SLH BLN/LN		2402	2602	2804	3204	3604	3804
Power supply	V-ph-Hz	400 ±10% / 3 / 50					
Number	n°	8	8	12	12	16	16
Rated power per fan	kW	2	2	2	2	2	2
Max. absorbed current per fan	A	4	4	4	4	4	4

Standard fans SLH ELN		1202	1402	1602	1802	1902	2002	2202
Power supply	V-ph-Hz	400 ±10% / 3 / 50						
Number	n°	6	6	6	8	8	10	8
Rated power per fan	kW	1,25	1,25	1,25	1,25	1,25	1,25	1,25
Max. absorbed current per fan	A	2,3	2,3	2,3	2,3	2,3	2,3	2,3

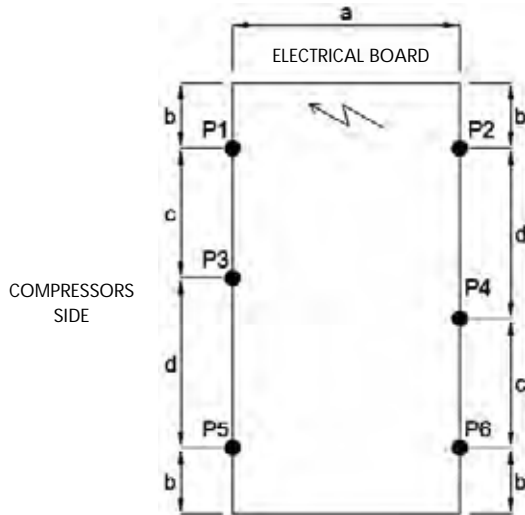
Standard fans SLH ELN		2402	2602	2804	3204	3604	3804
Power supply	V-ph-Hz	400 ±10% / 3 / 50					
Number	n°	10	10	12	16	16	16
Rated power per fan	kW	1,25	1,25	1,25	1,25	1,25	1,25
Max. absorbed current per fan	A	2,3	2,3	2,3	2,3	2,3	2,3

Standard fans SLH HET		1202	1402	1602	1802	1902	2002	2202
Power supply	V-ph-Hz	400 ±10% / 3 / 50						
Number	n°	6	6	8	8	8	10	8
Rated power per fan	kW	2	2	2	2	2	2	2
Max. absorbed current per fan	A	4	4	4	4	4	4	4

Standard fans SLH HET		2402	2602	2804	3204	3604	3804
Power supply	V-ph-Hz	400 ±10% / 3 / 50					
Number	n°	10	10	12	16	16	16
Rated power per fan	kW	2	2	2	2	2	2
Max. absorbed current per fan	A	4	4	4	4	4	4

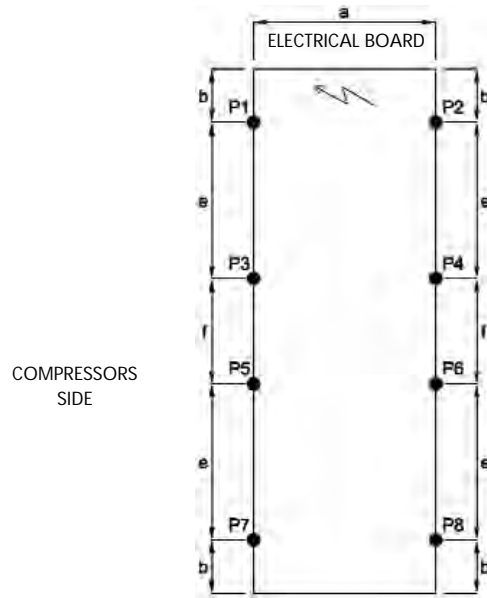
8.4 Position of antivibration mounting springs and weight distribution on supports

SLS/SLH 1202-2002 BLN/LN
SLS/SLH 1202-1802 ELN/HET



P1-P6 - Unit position

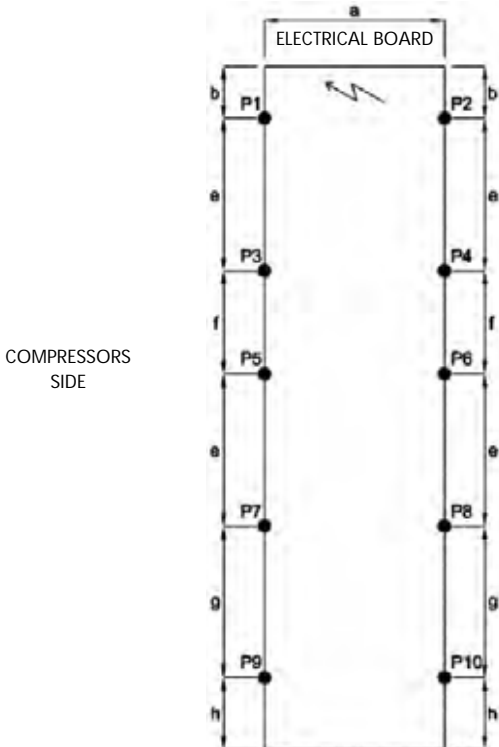
SLS 2202-3402 BLN/LN - SLS 1902-3402 ELN/HET
SLH 2202-2602 BLN/LN - SLH 1902-2602 ELN/HET



COMPRESSORS
SIDE

P1-P8 - Unit position

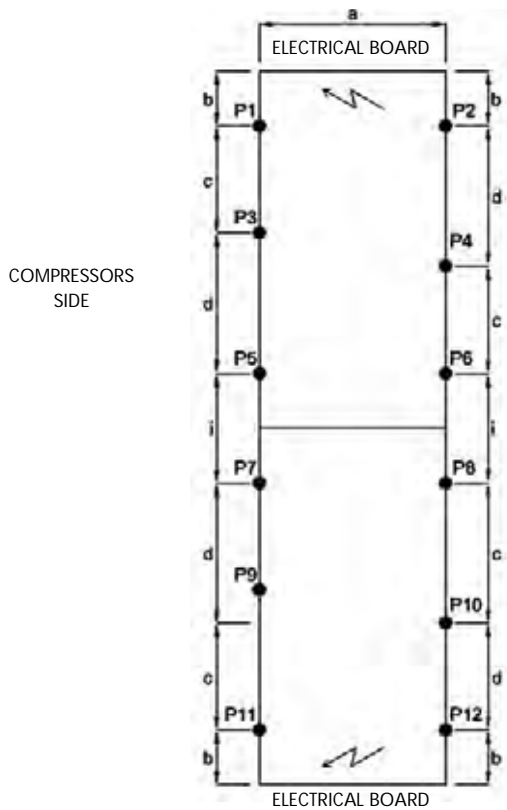
SLS 3802-4202 BLN/LN/ELN/HET



COMPRESSORS
SIDE

P1-P10 - Unit position

SLS 3804-4004 BLN/LN/ELN/HET
SLH 2804-3804 BLN/LN/ELN/HET



COMPRESSORS
SIDE

P1-P12 - Unit position

SLS 1202 - 4004 BLN and LN Versions

SLS Al/Cu	Distribution Weights (kg)												Shipping Weight (kg)	Operat. Weight (kg)	Position P1-P12										Barycentre Position	
	F1 (kg)	F2 (kg)	F3 (kg)	F4 (kg)	F5 (kg)	F6 (kg)	F7 (kg)	F8 (kg)	F9 (kg)	F10 (kg)	F11 (kg)	F12 (kg)			a* (mm)	b (mm)	c (mm)	d (mm)	e (mm)	f (mm)	g (mm)	h (mm)	i (mm)	x (mm)	y (mm)	
1202	576	576	576	576	576	576	-	-	-	-	-	-	3430	3456	2099	615	1208	1583	-	-	-	-	-	-	942	2096
1402	646	646	646	646	646	646	-	-	-	-	-	-	3850	3876	2099	615	1208	1583	-	-	-	-	-	-	894	2105
1602	654	654	654	654	654	654	-	-	-	-	-	-	3890	3923	2099	615	1208	1583	-	-	-	-	-	-	899	2114
1802	666	666	666	666	666	666	-	-	-	-	-	-	3960	4000	2099	615	1208	1583	-	-	-	-	-	-	913	2148
1902	738	738	738	738	738	738	-	-	-	-	-	-	4390	4430	2099	615	1208	1583	-	-	-	-	-	-	894	2140
2002	800	800	800	800	800	800	-	-	-	-	-	-	4760	4800	2099	615	1208	1583	-	-	-	-	-	-	854	2138
2202	769	769	612	612	612	612	769	769	-	-	-	-	5480	5530	2099	615	-	-	1792	1206	-	-	-	-	936	3136
2402	819	819	651	651	651	651	819	819	-	-	-	-	5840	5890	2099	615	-	-	1792	1206	-	-	-	-	902	3135
2602	856	856	681	681	681	681	856	856	-	-	-	-	6110	6160	2099	615	-	-	1792	1206	-	-	-	-	908	3130
3002	928	928	738	738	738	738	928	928	-	-	-	-	6470	6677	2099	615	-	-	1792	1206	-	-	-	-	991	2977
3402	948	948	754	754	754	754	948	948	-	-	-	-	6610	6817	2099	615	-	-	1792	1206	-	-	-	-	986	3003
3802	896	896	896	896	896	896	896	896	896	896	-	-	8740	8962	2099	615	-	-	1792	1206	1776	838	-	952	4392	
4202	907	907	907	907	907	907	907	907	907	907	-	-	8850	9072	2099	615	-	-	1792	1206	1776	838	-	950	4419	
3804	738	738	738	738	738	738	738	738	738	738	738	738	8780	8860	2099	615	1208	1583	-	-	-	-	1233	894	4148	
4004	802	802	802	802	802	802	802	802	802	802	802	802	9520	9620	2099	615	1208	1583	-	-	-	-	1233	854	4146	

SLS 1202 - 4004 ELN and HET Versions

SLS Al/Cu	Distribution Weights (kg)												Shipping Weight (kg)	Operat. Weight (kg)	Position P1-P12										Barycentre Position	
	F1 (kg)	F2 (kg)	F3 (kg)	F4 (kg)	F5 (kg)	F6 (kg)	F7 (kg)	F8 (kg)	F9 (kg)	F10 (kg)	F11 (kg)	F12 (kg)			a* (mm)	b (mm)	c (mm)	d (mm)	e (mm)	f (mm)	g (mm)	h (mm)	i (mm)	x (mm)	y (mm)	
1202	588	588	588	588	588	588	-	-	-	-	-	-	3500	3526	2099	615	1208	1583	-	-	-	-	-	-	945	2105
1402	680	680	680	680	680	680	-	-	-	-	-	-	4050	4076	2099	615	1208	1583	-	-	-	-	-	-	904	2101
1602	699	699	699	699	699	699	-	-	-	-	-	-	4160	4193	2099	615	1208	1583	-	-	-	-	-	-	912	2133
1802	700	700	700	700	700	700	-	-	-	-	-	-	4160	4200	2099	615	1208	1583	-	-	-	-	-	-	922	2141
1902	745	745	593	593	593	593	745	745	-	-	-	-	5320	5360	2099	615	1208	1583	-	-	-	-	-	-	928	2762
2002	808	808	643	643	643	643	808	808	-	-	-	-	5770	5810	2099	615	1208	1583	-	-	-	-	-	-	896	2792
2202	803	803	639	639	639	639	803	803	-	-	-	-	5730	5780	2099	615	-	-	1792	1206	-	-	-	-	943	3131
2402	863	863	687	687	687	687	863	863	-	-	-	-	6160	6210	2099	615	-	-	1792	1206	-	-	-	-	912	3134
2602	895	895	712	712	712	712	895	895	-	-	-	-	6390	6440	2099	615	-	-	1792	1206	-	-	-	-	916	3141
3002	967	967	769	769	769	769	967	967	-	-	-	-	6750	6957	2099	615	-	-	1792	1206	-	-	-	-	995	3005
3402	977	977	777	777	777	777	977	977	-	-	-	-	6820	7027	2099	615	-	-	1792	1206	-	-	-	-	989	3003
3802	948	948	948	948	948	948	948	948	948	948	-	-	9260	9482	2099	615	-	-	1792	1206	1776	838	-	960	4397	
4202	960	960	960	960	960	960	960	960	960	960	-	-	9380	9602	2099	615	-	-	1792	1206	1776	838	-	959	4392	
3804	776	776	776	776	776	776	776	776	776	776	776	776	9230	9310	2099	615	1208	1583	-	-	-	-	1233	903	4141	
4004	838	838	838	838	838	838	838	838	838	838	838	838	9970	10050	2099	615	1208	1583	-	-	-	-	1233	865	4140	

* Data of antivibrating rubber supports units.
For units without antivibrating rubber supports values must be reduced of 150mm.

SLH 1202 - 3804 BLN and LN Versions

SLH Al/Cu	Distribution Weights (kg)												Shipping Weight (kg)	Operat. Weight (kg)	Position P1-P12										Barycentre Position	
	F1 (kg)	F2 (kg)	F3 (kg)	F4 (kg)	F5 (kg)	F6 (kg)	F7 (kg)	F8 (kg)	F9 (kg)	F10 (kg)	F11 (kg)	F12 (kg)			a* (mm)	b (mm)	c (mm)	d (mm)	e (mm)	f (mm)	g (mm)	h (mm)	i (mm)	x (mm)	y (mm)	
1202	594	594	594	594	594	594	-	-	-	-	-	-	3540	3566	2099	615	1208	1583	-	-	-	-	-	947	2094	
1402	664	664	664	664	664	664	-	-	-	-	-	-	3960	3986	2009	615	1208	1583	-	-	-	-	-	900	2103	
1602	672	672	672	672	672	672	-	-	-	-	-	-	4000	4033	2009	615	1208	1583	-	-	-	-	-	905	2111	
1802	686	686	686	686	686	686	-	-	-	-	-	-	4075	4115	2009	615	1208	1583	-	-	-	-	-	918	2144	
1902	758	758	758	758	758	758	-	-	-	-	-	-	4510	4550	2009	615	1208	1583	-	-	-	-	-	899	2137	
2002	820	820	820	820	820	820	-	-	-	-	-	-	4880	4920	2009	615	1208	1583	-	-	-	-	-	860	2127	
2202	1108	1108	882	882	882	882	1108	1108	-	-	-	-	5600	5650	2009	615	-	-	1792	1206	-	-	-	939	3134	
2402	1121	1121	892	892	892	892	1121	1121	-	-	-	-	5960	6010	2009	615	-	-	1792	1206	-	-	-	906	3133	
2602	1144	1144	910	910	910	910	1144	1144	-	-	-	-	6230	6280	2009	615	-	-	1792	1206	-	-	-	911	3127	
2804	664	664	664	664	664	664	664	664	664	664	664	664	7920	7973	2009	615	1208	1583	-	-	-	-	1233	900	4018	
3204	672	672	672	672	672	672	672	672	672	672	672	672	8000	8066	2009	615	1208	1583	-	-	-	-	1233	905	4018	
3604	686	686	686	686	686	686	686	686	686	686	686	686	8150	8230	2009	615	1208	1583	-	-	-	-	1233	918	4018	
3804	753	753	753	753	753	753	753	753	753	753	753	753	8955	9035	2009	615	1208	1583	-	-	-	-	1233	889	4200	

SLH 1202 - 3804 ELN and HET Versions

SLH Al/Cu	Distribution Weights (kg)												Shipping Weight (kg)	Operat. Weight (kg)	Position P1-P12										Barycentre Position	
	F1 (kg)	F2 (kg)	F3 (kg)	F4 (kg)	F5 (kg)	F6 (kg)	F7 (kg)	F8 (kg)	F9 (kg)	F10 (kg)	F11 (kg)	F12 (kg)			a* (mm)	b (mm)	c (mm)	d (mm)	e (mm)	f (mm)	g (mm)	h (mm)	i (mm)	x (mm)	y (mm)	
1202	606	606	606	606	606	606	-	-	-	-	-	-	3610	3636	2099	615	1208	1583	-	-	-	-	-	950	2102	
1402	698	698	698	698	698	698	-	-	-	-	-	-	4160	4186	2009	615	1208	1583	-	-	-	-	-	909	2098	
1602	717	717	717	717	717	717	-	-	-	-	-	-	4270	4303	2009	615	1208	1583	-	-	-	-	-	917	2130	
1802	720	720	720	720	720	720	-	-	-	-	-	-	4280	4320	2009	615	1208	1583	-	-	-	-	-	927	2138	
1902	761	761	606	606	606	606	761	761	-	-	-	-	5440	5480	2009	615	-	-	1792	1206	-	-	-	932	2762	
2002	822	822	655	655	655	655	822	822	-	-	-	-	5880	5920	2009	615	-	-	1792	1206	-	-	-	900	2792	
2202	820	820	653	653	653	653	820	820	-	-	-	-	5850	5900	2009	615	-	-	1792	1206	-	-	-	946	3128	
2402	879	879	700	700	700	700	879	879	-	-	-	-	6280	6330	2009	615	-	-	1792	1206	-	-	-	915	3132	
2602	911	911	726	726	726	726	911	911	-	-	-	-	6510	6560	2009	615	-	-	1792	1206	-	-	-	919	3139	
2804	698	698	698	698	698	698	698	698	698	698	698	698	8320	8373	2009	615	1208	1583	-	-	-	-	1233	909	4018	
3204	717	717	717	717	717	717	717	717	717	717	717	717	8540	8606	2009	615	1208	1583	-	-	-	-	1233	917	4018	
3604	720	720	720	720	720	720	720	720	720	720	720	720	8560	8640	2009	615	1208	1583	-	-	-	-	1233	927	4018	
3804	851	851	851	851	851	851	726	726	726	726	726	726	9380	9460	2009	615	1208	1583	-	-	-	-	1233	914	4200	

* Data of antivibrating rubber supports units.
For units without antivibrating rubber supports values must be reduced of 150mm.

SLS-R 1202 - 4202 BLN and LN Versions

SLS Al/Cu	Distribution Weights (kg)										Shipping Weight (kg)	Operat. Weight (kg)	Position P1-P10									Barycentre Position	
	F1 (kg)	F2 (kg)	F3 (kg)	F4 (kg)	F5 (kg)	F6 (kg)	F7 (kg)	F8 (kg)	F9 (kg)	F10 (kg)			a* (mm)	b (mm)	c (mm)	d (mm)	e (mm)	f (mm)	g (mm)	h (mm)	i (mm)	x (mm)	y (mm)
1202	697	563	670	527	634	500	-	-	-	-	3530	3590	2099	615	1208	1583	-	-	-	-	-	963	2067
1402	811	606	779	564	737	533	-	-	-	-	3970	4030	2099	615	1208	1583	-	-	-	-	-	918	2071
1602	823	624	784	573	733	534	-	-	-	-	4000	4070	2099	615	1208	1583	-	-	-	-	-	924	2082
1802	838	672	815	642	784	619	-	-	-	-	4290	4370	2099	615	1208	1583	-	-	-	-	-	962	2052
1902	933	722	913	697	888	677	-	-	-	-	4740	4830	2099	615	1208	1583	-	-	-	-	-	943	2045
2002	1037	749	1014	719	984	696	-	-	-	-	5110	5200	2099	615	1208	1583	-	-	-	-	-	903	2050
2202	830	643	854	667	870	683	895	708	-	-	6040	6150	2099	615	-	-	1792	1206	-	-	-	955	2956
2402	905	661	930	686	947	703	971	727	-	-	6410	6530	2099	615	-	-	1792	1206	-	-	-	924	2958
2602	940	693	967	720	985	738	1012	765	-	-	6690	6820	2099	615	-	-	1792	1206	-	-	-	929	2954
3002	854	738	944	828	1005	888	1094	978	-	-	7060	7330	2099	615	-	-	1792	1206	-	-	-	1020	2843
3402	873	749	967	844	1031	908	1126	1002	-	-	7240	7500	2099	615	-	-	1792	1206	-	-	-	1018	2838
2802	1048	856	1064	872	1075	883	1091	899	1107	915	9490	9810	2099	615	-	-	1792	1206	1776	838	-	981	4127
4202	1078	881	1085	888	1090	893	1097	900	1104	906	9600	9920	2099	615	-	-	1792	1206	1776	838	-	980	4154

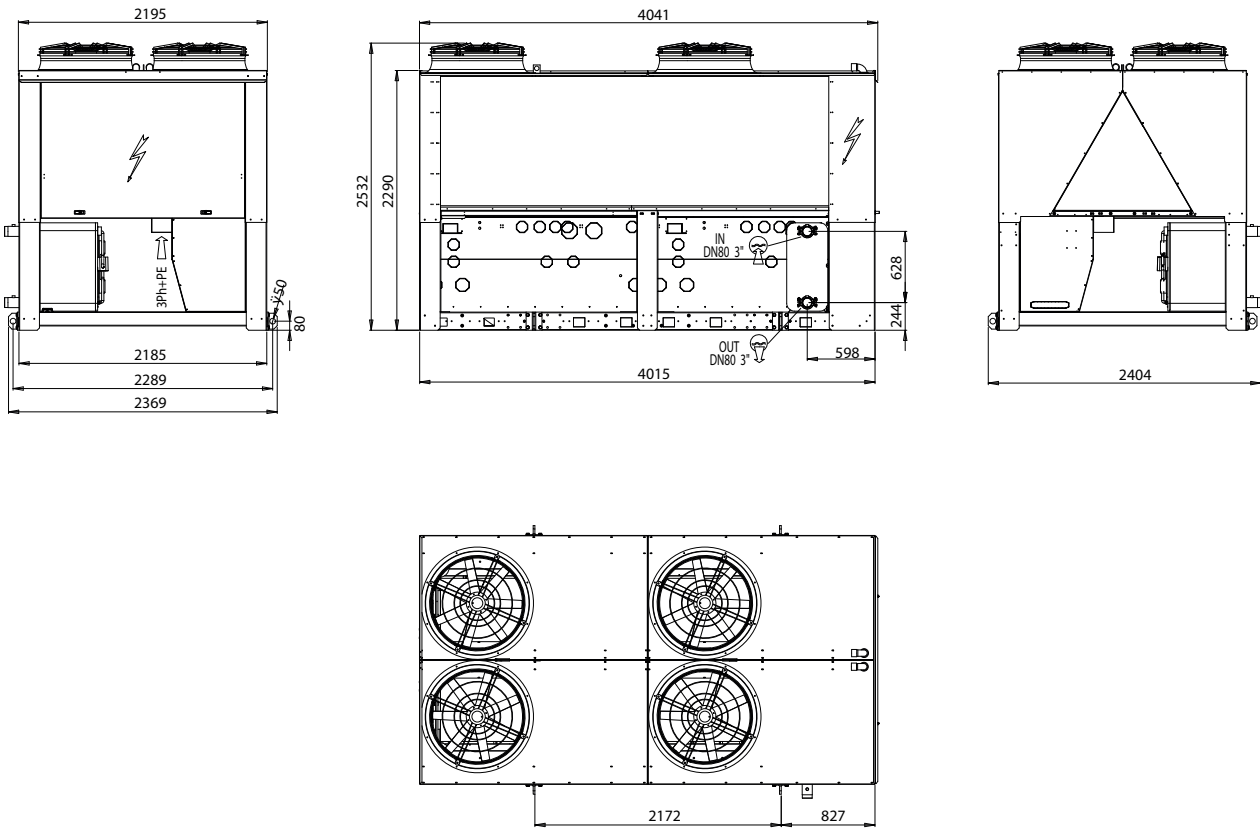
SLS-R 1202 - 4202 ELN and HET Versions

SLS Al/Cu	Distribution Weights (kg)										Shipping Weight (kg)	Operat. Weight (kg)	Position P1-P10									Barycentre Position	
	F1 (kg)	F2 (kg)	F3 (kg)	F4 (kg)	F5 (kg)	F6 (kg)	F7 (kg)	F8 (kg)	F9 (kg)	F10 (kg)			a* (mm)	b (mm)	c (mm)	d (mm)	e (mm)	f (mm)	g (mm)	h (mm)	i (mm)	x (mm)	y (mm)
1202	715	581	682	538	639	505	-	-	-	-	3610	3660	2099	615	1208	1583	-	-	-	-	-	965	2075
1402	844	639	812	598	771	566	-	-	-	-	4170	4230	2099	615	1208	1583	-	-	-	-	-	296	2068
1602	888	691	832	618	759	562	-	-	-	-	4280	4350	2099	615	1208	1583	-	-	-	-	-	934	2102
1802	871	705	848	675	818	652	-	-	-	-	4490	4570	2099	615	1208	1583	-	-	-	-	-	968	2050
1902	600	441	749	590	850	691	999	780	-	-	5670	5760	2099	615	-	-	1792	1206	-	-	-	967	2658
2002	691	473	835	618	932	715	1077	799	-	-	6110	6200	2099	615	-	-	1792	1206	-	-	-	934	2693
2202	861	674	885	698	902	715	926	739	-	-	6290	6400	2099	615	-	-	1792	1206	-	-	-	960	2958
2402	949	705	971	727	986	742	1008	767	-	-	6740	6850	2099	615	-	-	1792	1206	-	-	-	931	2966
2602	986	739	1005	758	1017	770	1036	789	-	-	6970	7100	2099	615	-	-	1792	1206	-	-	-	935	2974
3002	885	768	978	862	1041	925	1134	1018	-	-	7340	7610	2099	615	-	-	1792	1206	-	-	-	1023	2843
3402	898	775	992	869	1056	933	1150	1027	-	-	7450	7700	2099	615	-	-	1792	1206	-	-	-	1020	2843
2802	1111	919	1122	929	1129	936	1139	947	1150	957	10020	10340	2099	615	-	-	1792	1206	1776	838	-	987	4145
4202	1123	926	1134	937	1142	945	1153	956	1165	968	10130	10450	2099	615	-	-	1792	1206	1776	838	-	986	4143

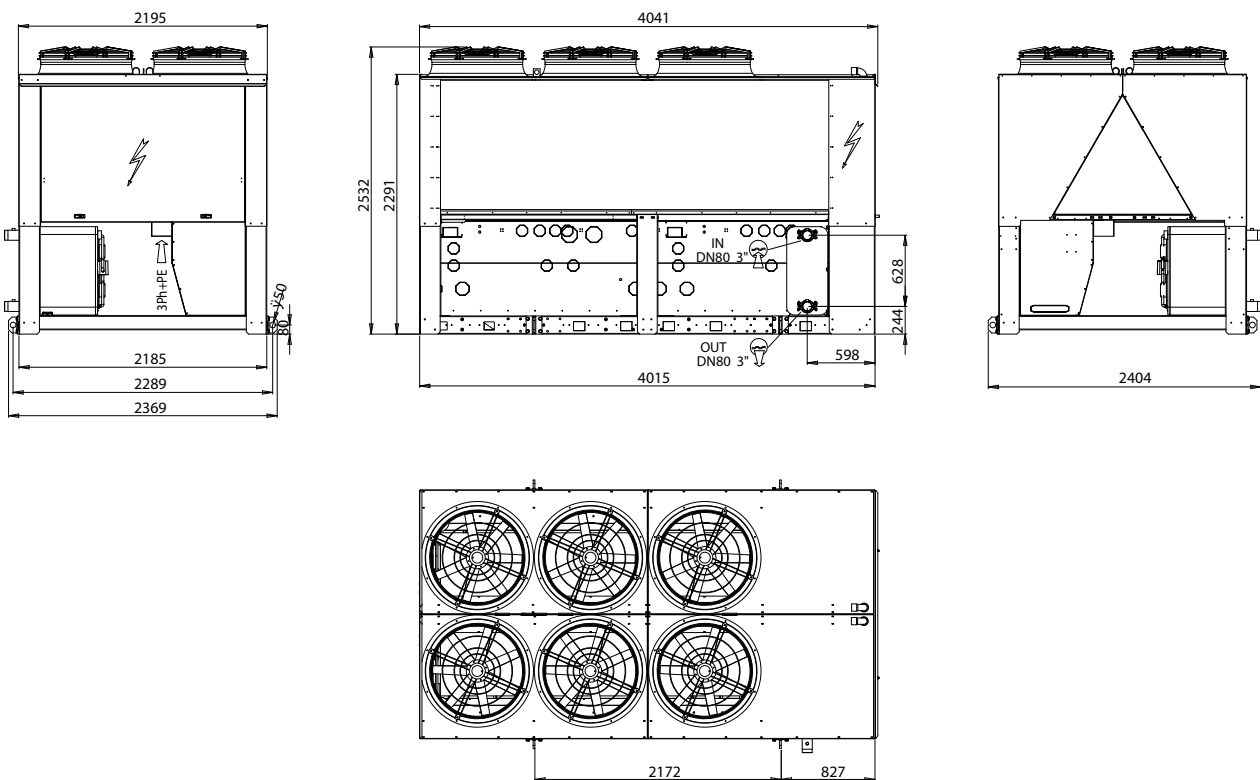
* Data of antivibrating rubber supports units.
For units without antivibrating rubber supports values must be reduced of 150mm.

8.5 Overall dimensions

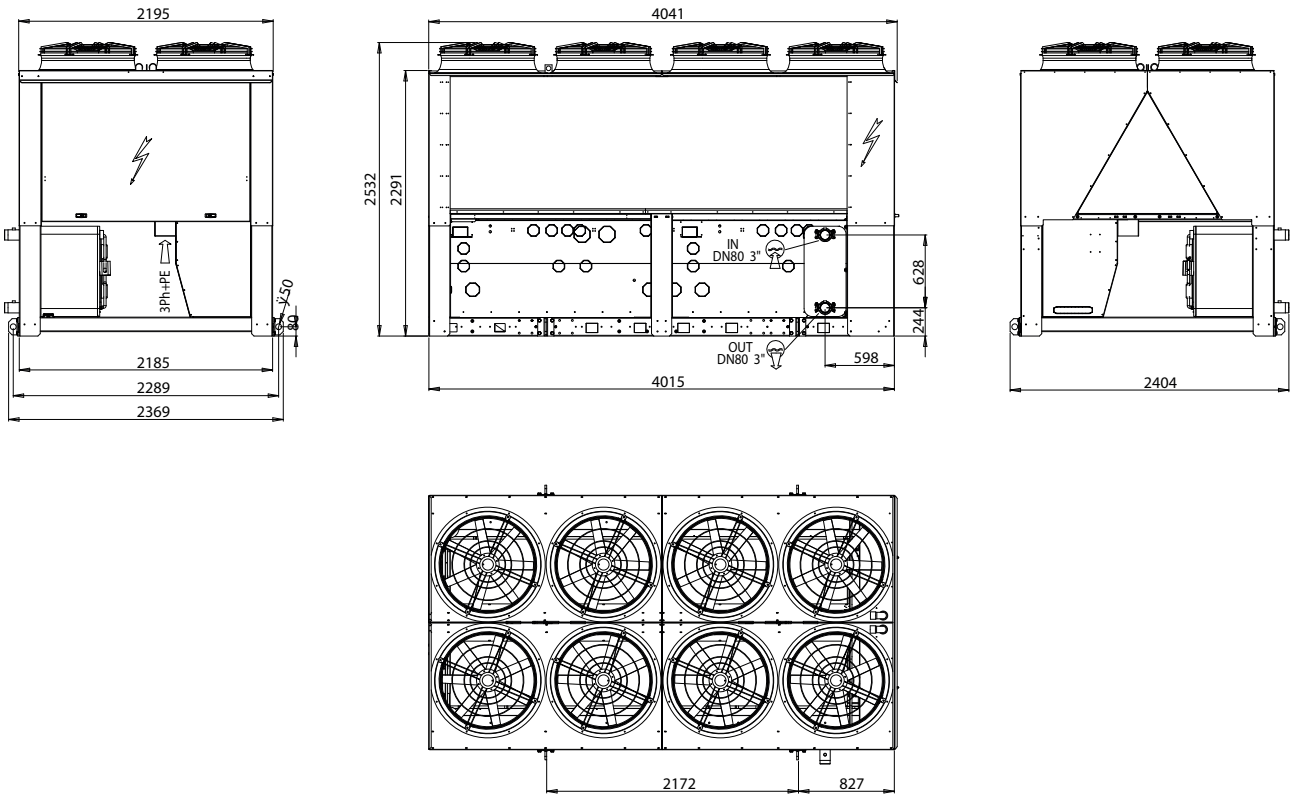
SLS/SLH 1202 BLN/LN



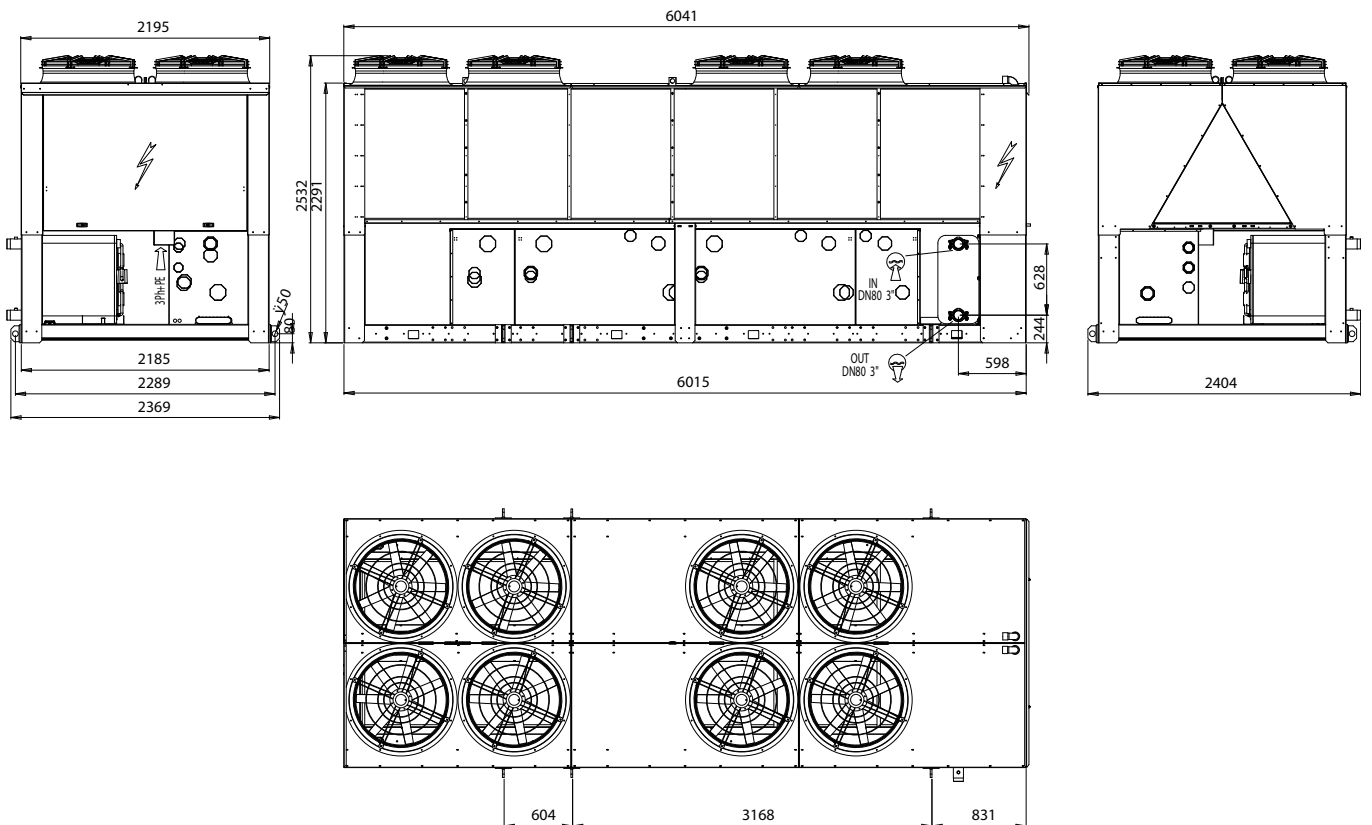
SLS/SLH 1402-1602 BLN/LN - SLS/SLH 1202-1402 ELN/HET



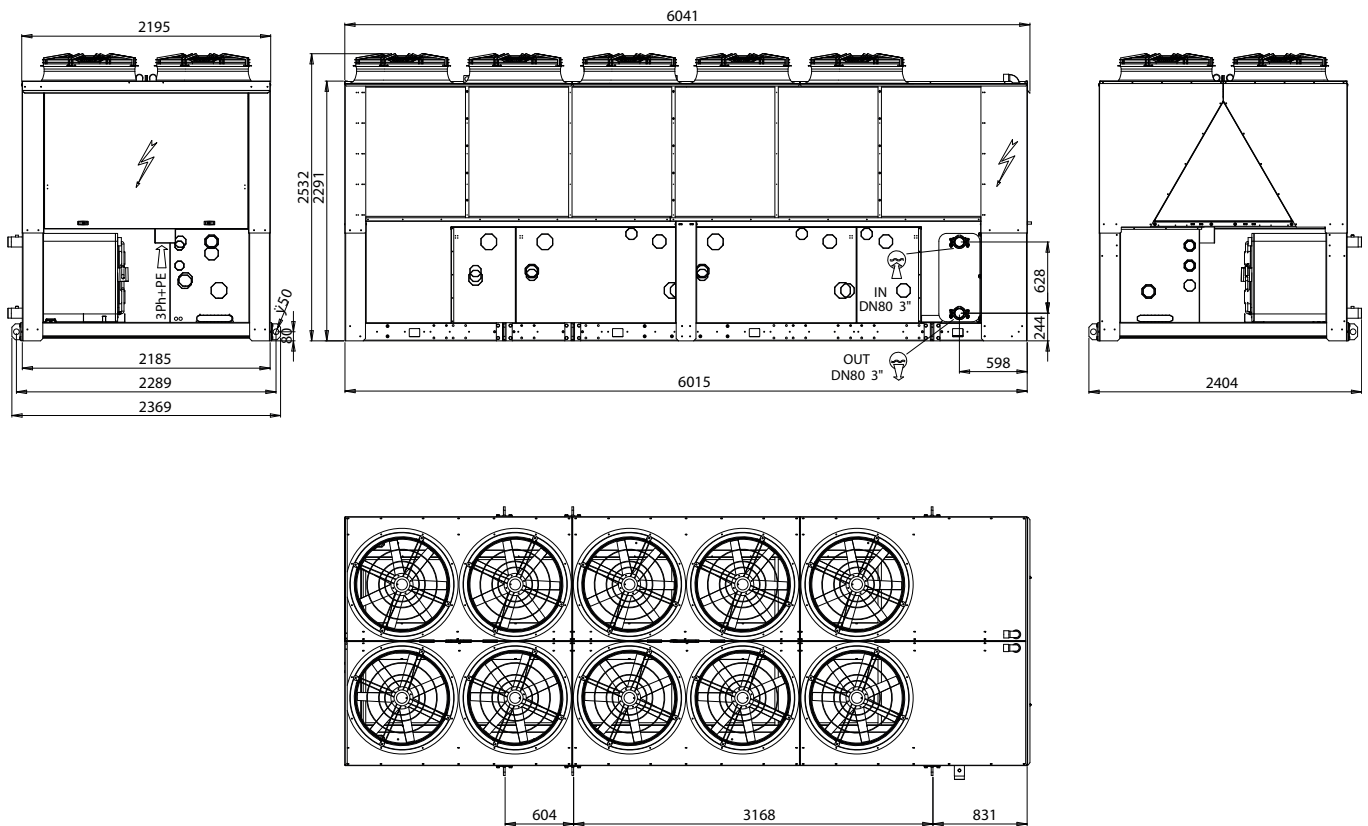
SLS/SLH 1602-1802 ELN/HET - SLS/SLH 1802-1902-2002 BLN/LN



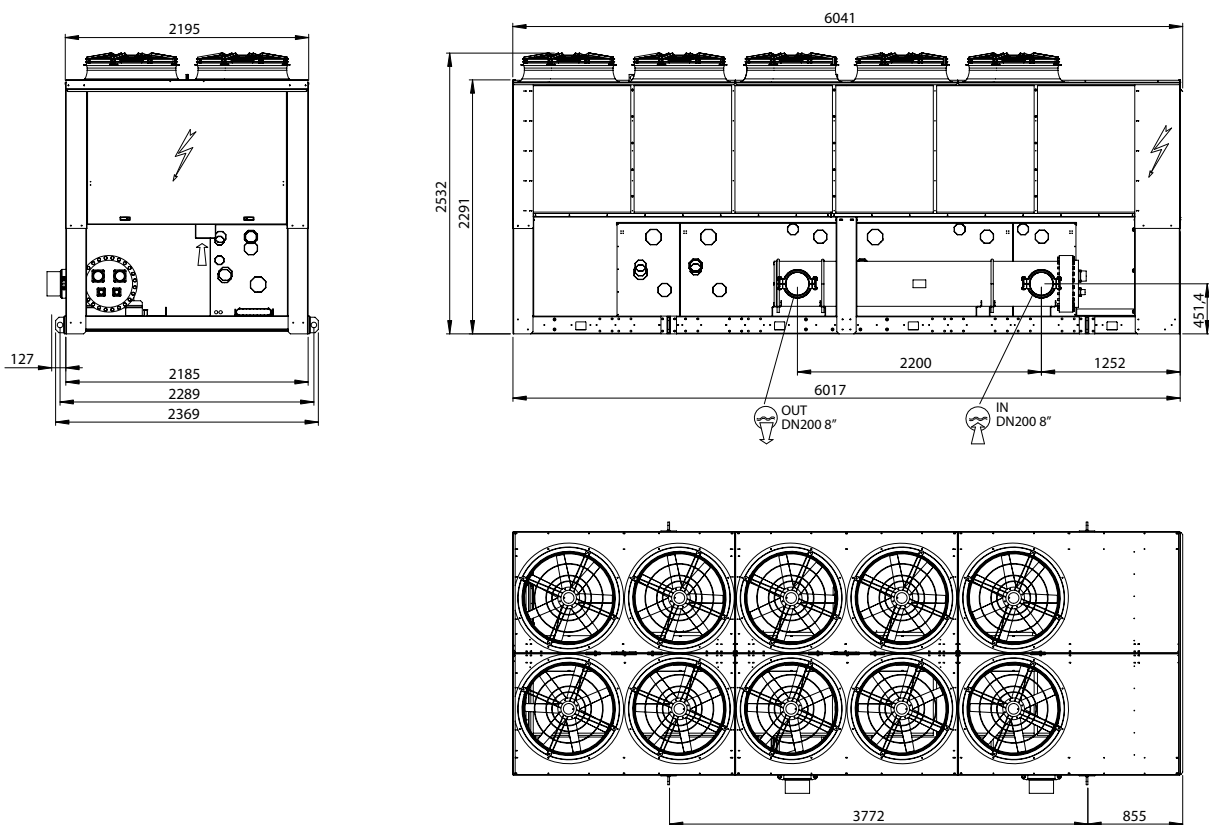
SLS/SLH 1902-2202 ELN/HET - SLS/SLH 2202-2402-2602 BLN/LN



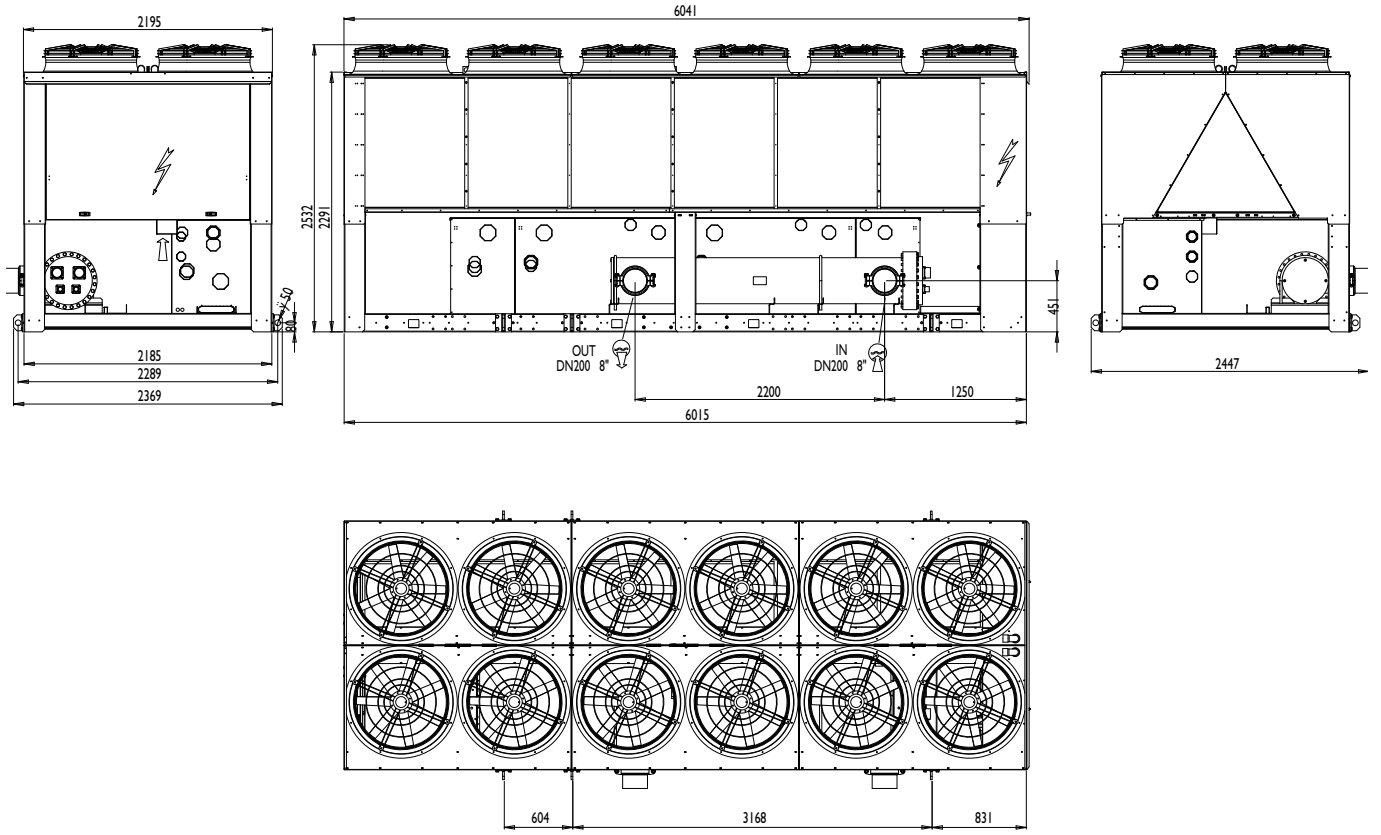
SLS/SLH 2002-2402-2602 ELN/HET



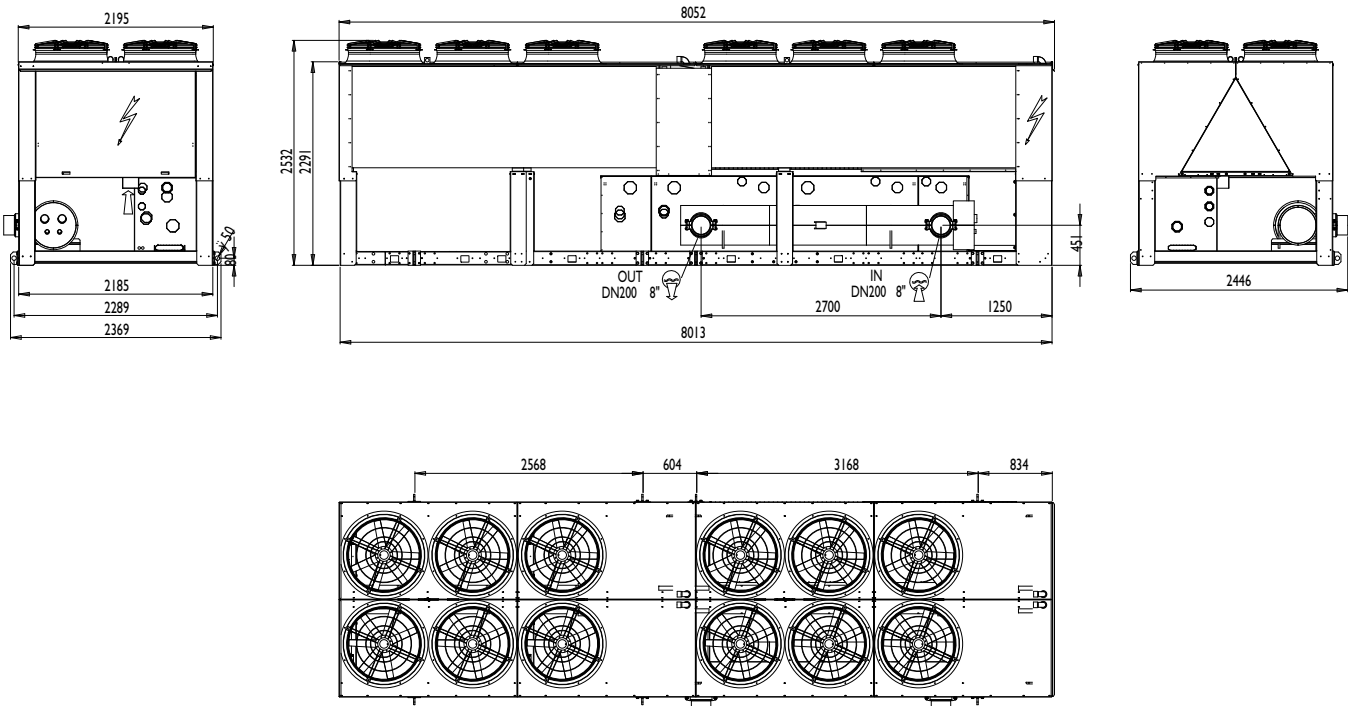
SLS 3002 BLN/LN



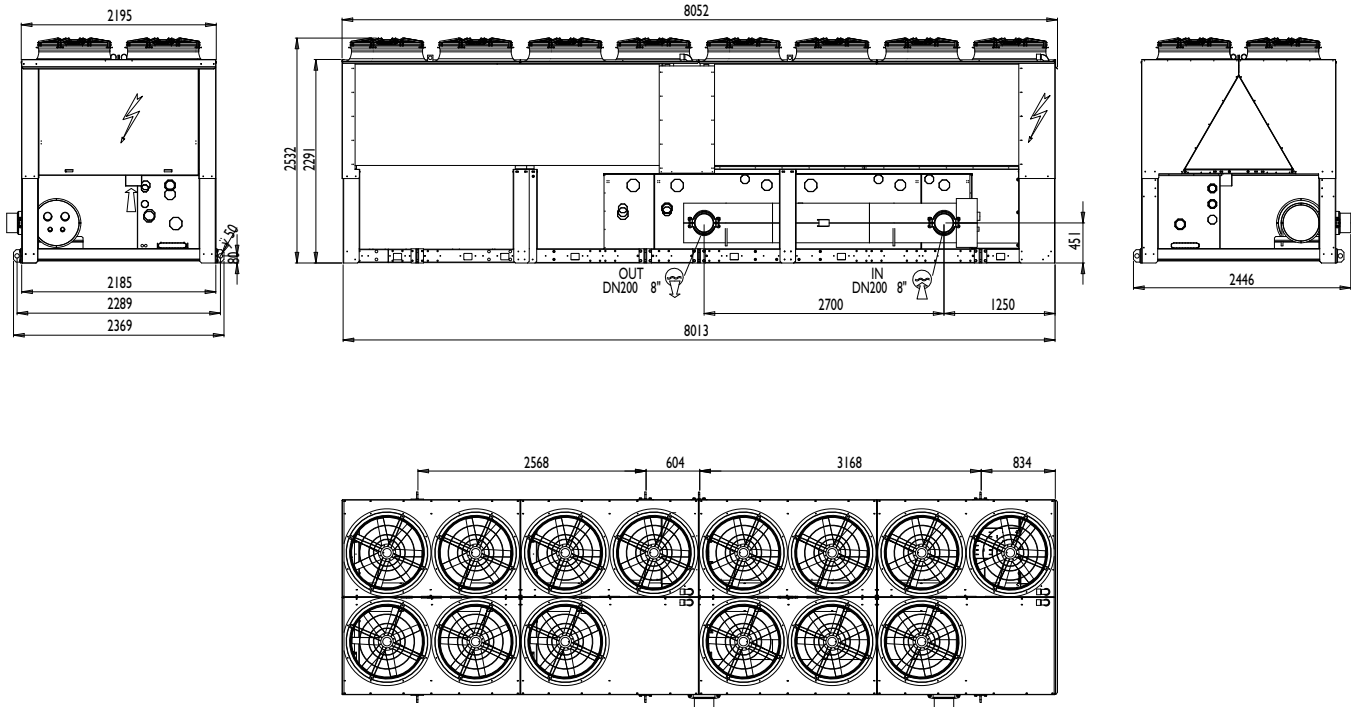
SLS 3002-3402 ELN/HET - SLS 3402 BLN/LN



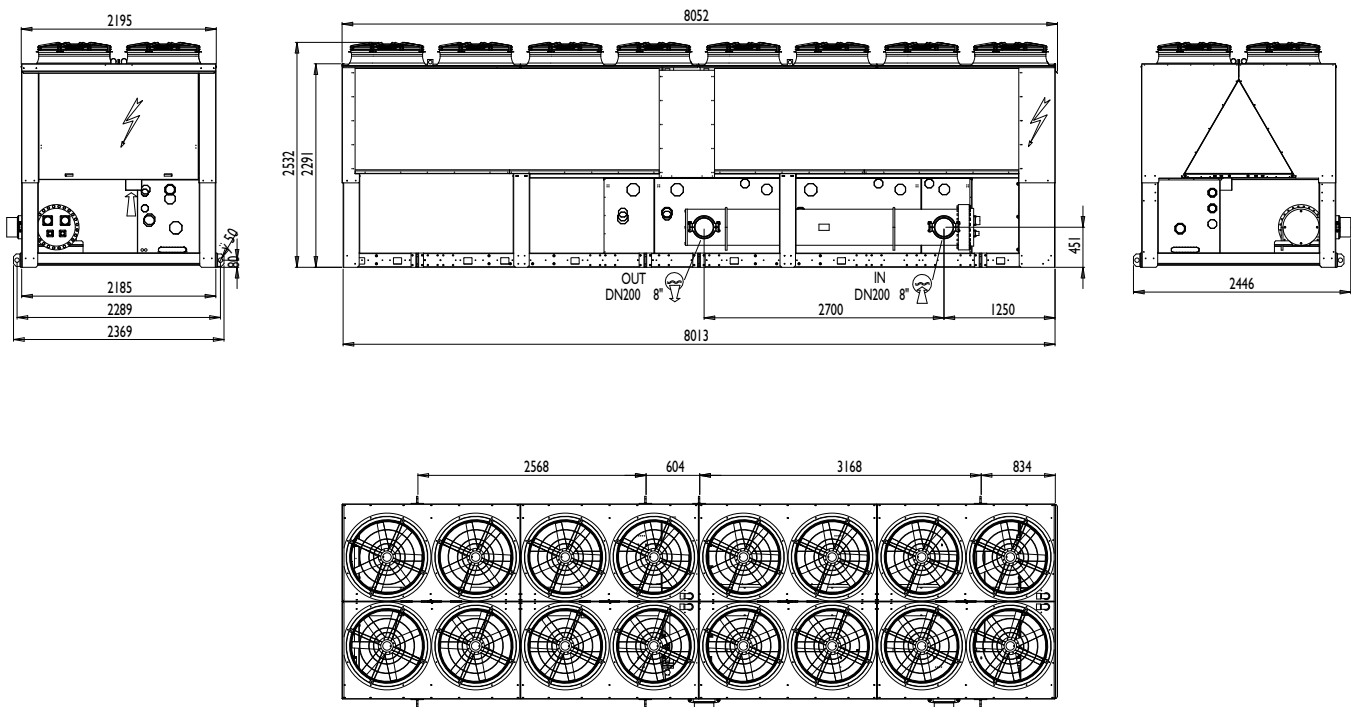
SLS 3802 BLN/LN



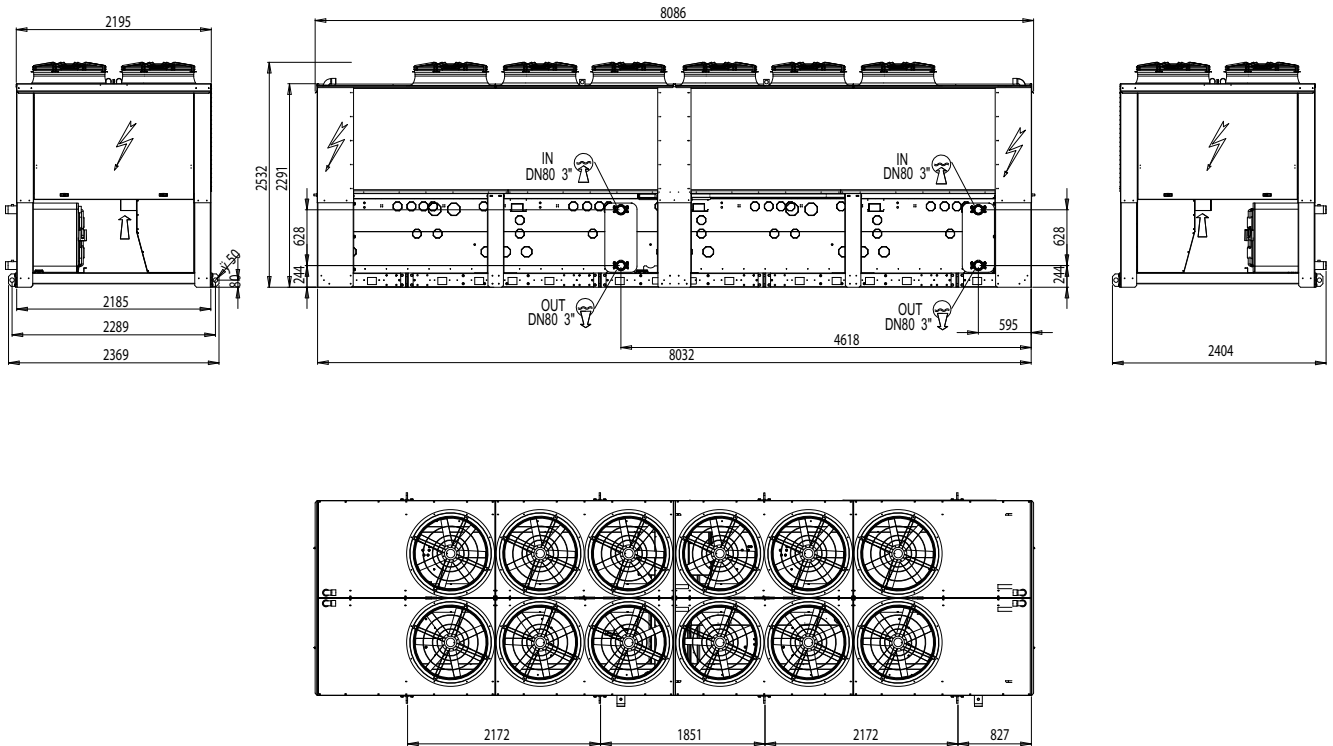
SLS 3802 ELN-HET - SLS 4202 BLN-LN



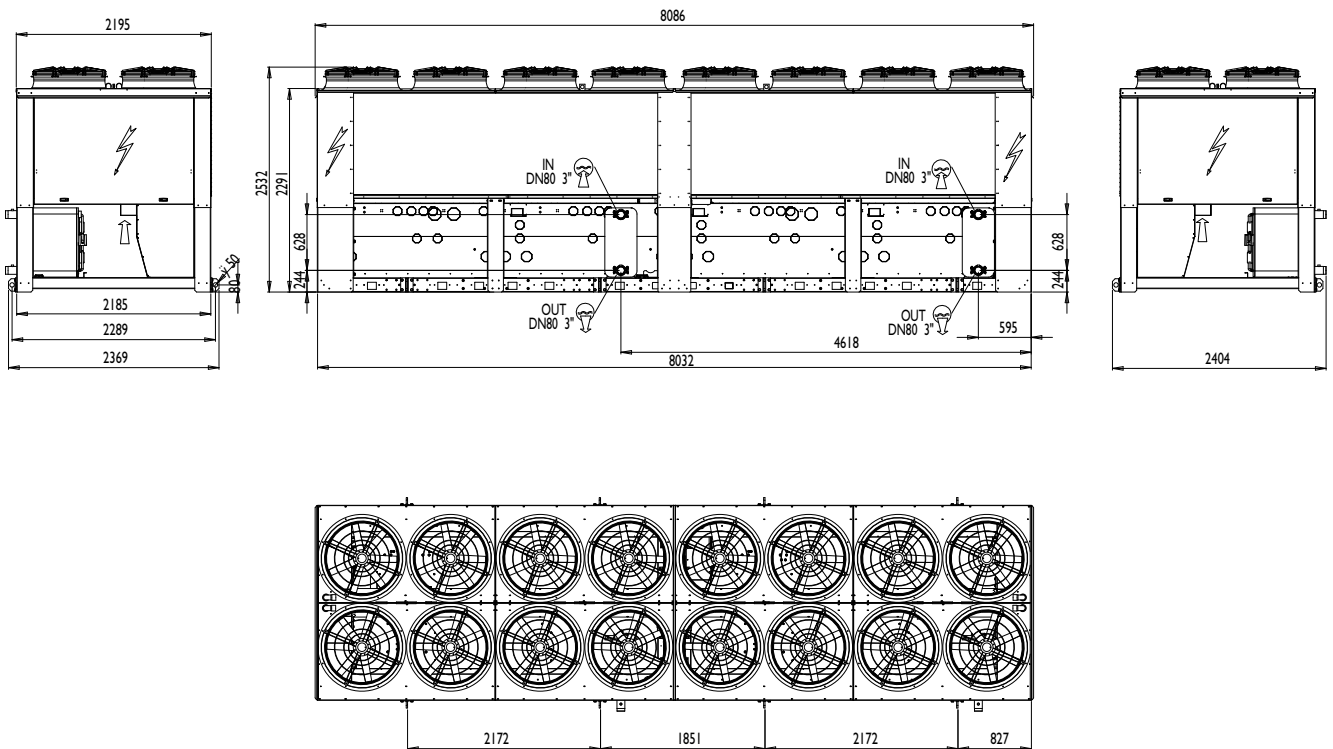
SLS 4202 ELN-HET



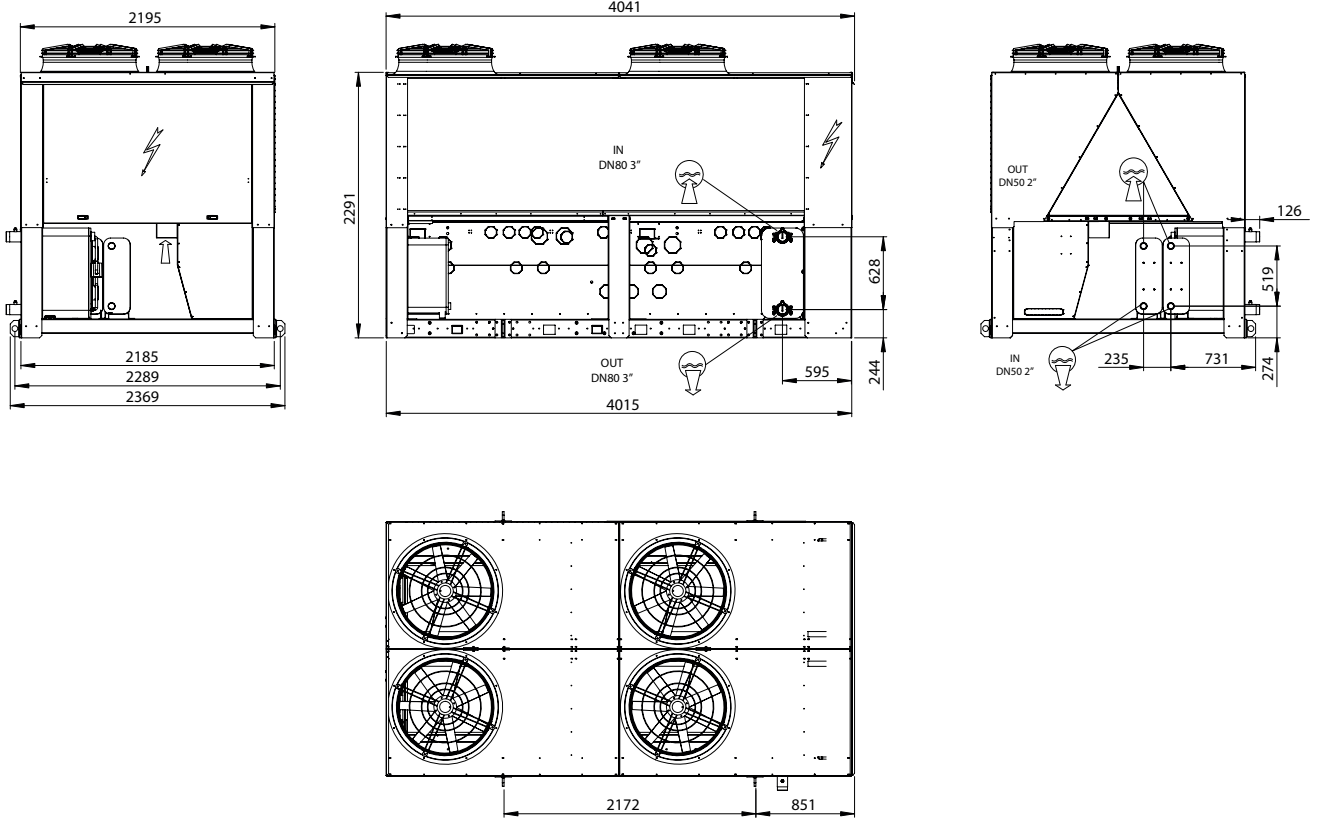
SLH 2804 BLN/LN/ELN/HET - SLH 3204 BLN/LN



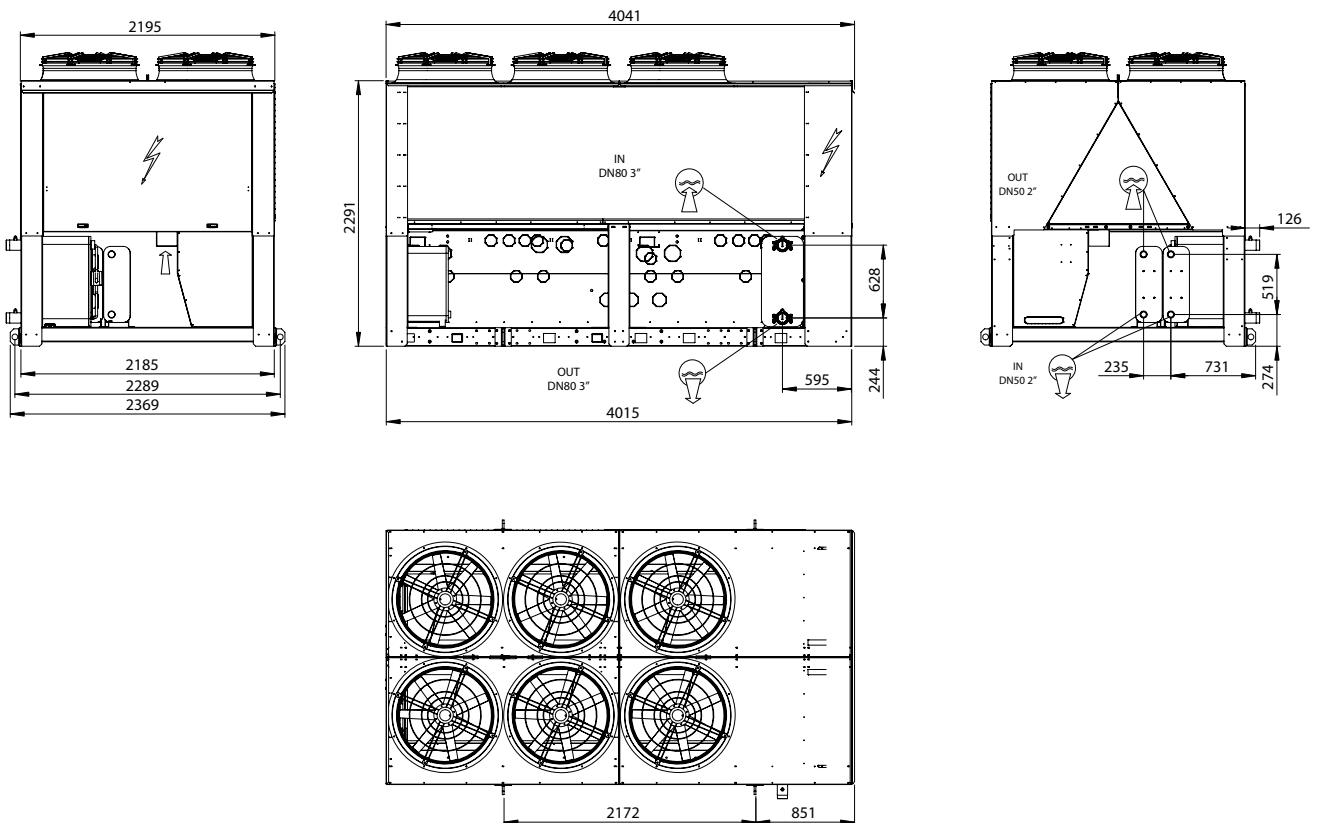
SLH 3204 ELN/HET - SLH 3604-3804 BLN/LN/ELN/HET
SLS 3804-4004 BLN/LN/ELN/HET



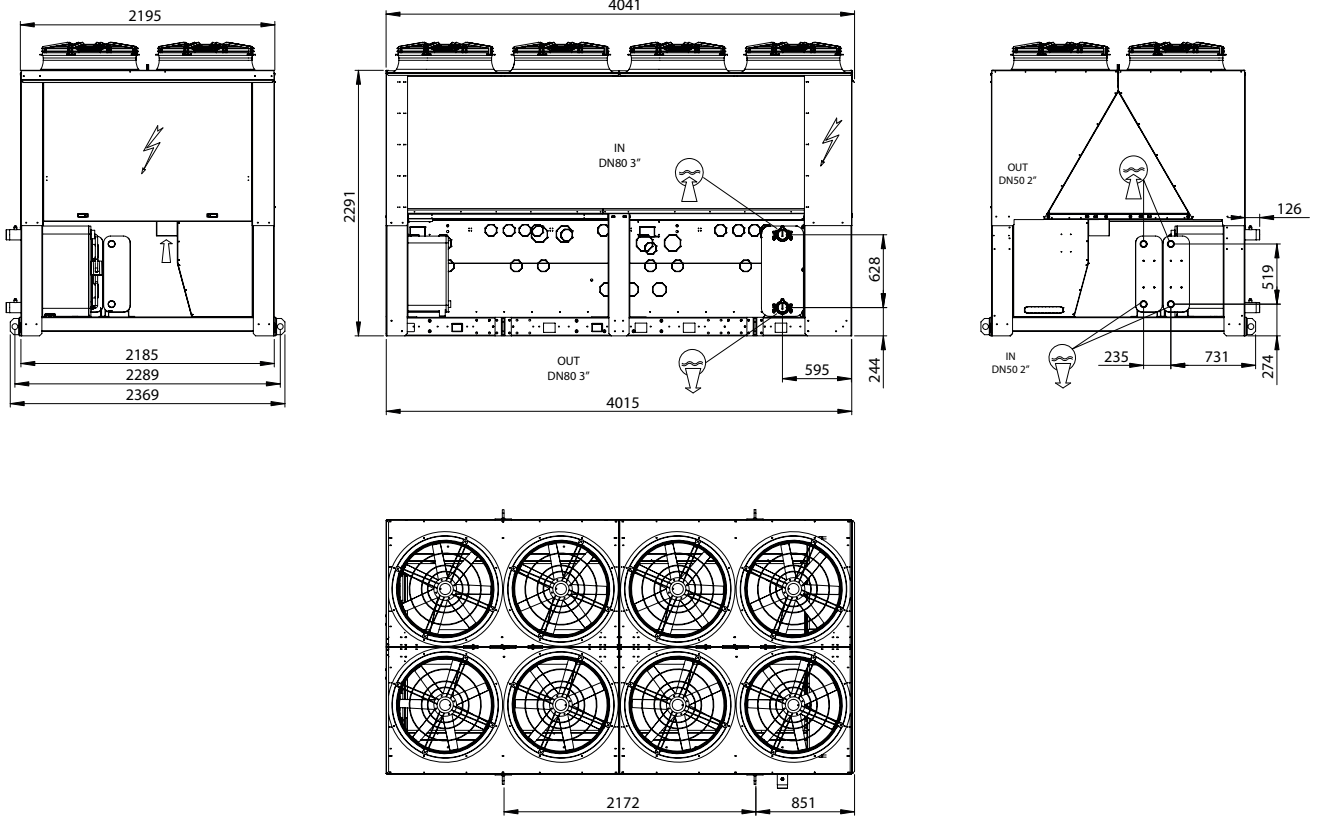
SLS-R 1202 BLN/LN



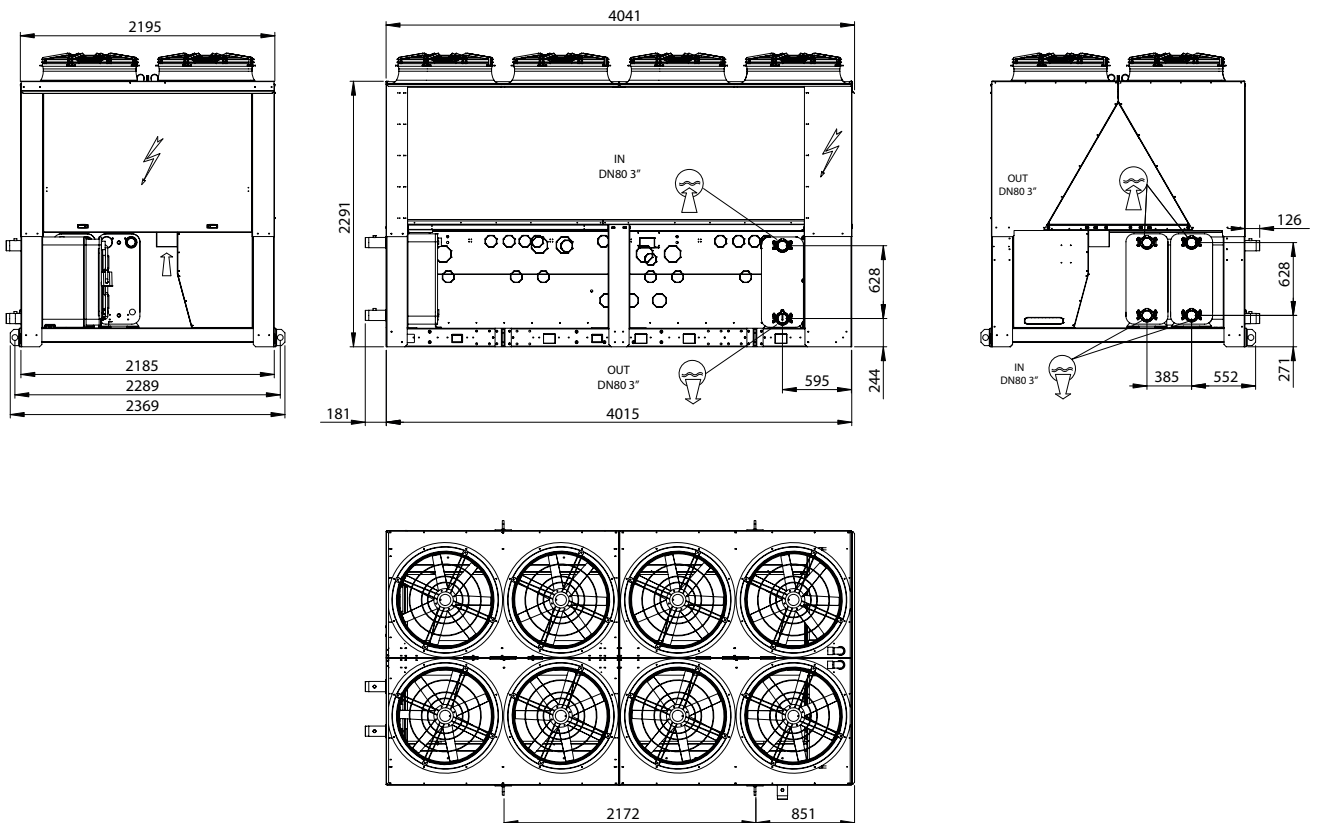
SLS-R 1402-1602 BLN/LN - SLS-R1202-1402 ELN/HET



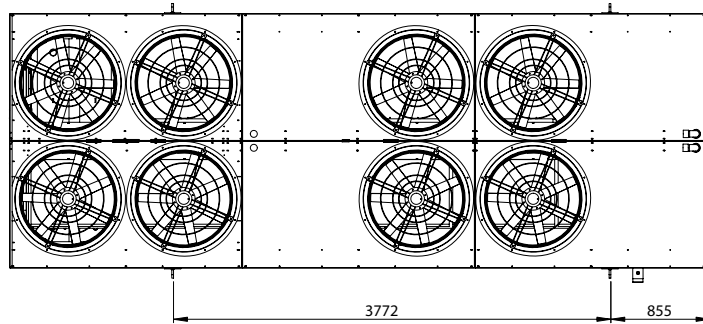
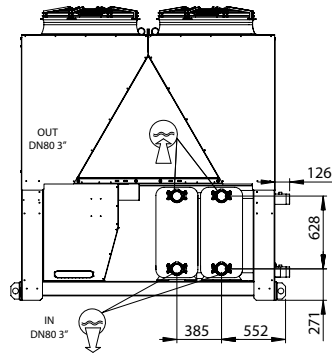
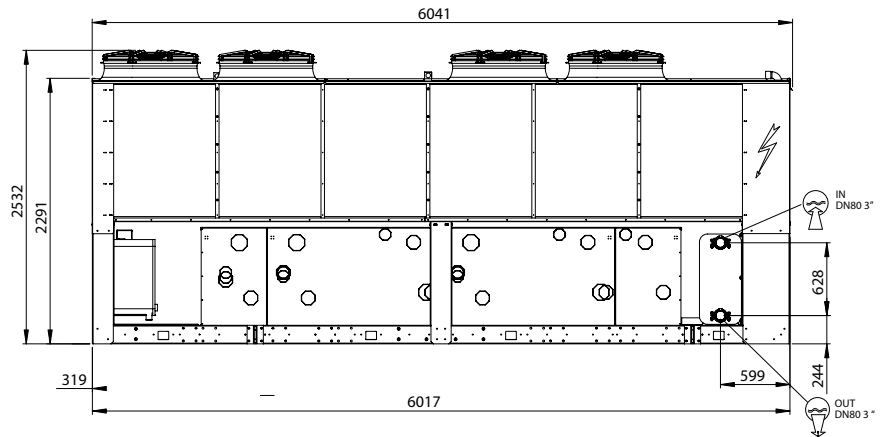
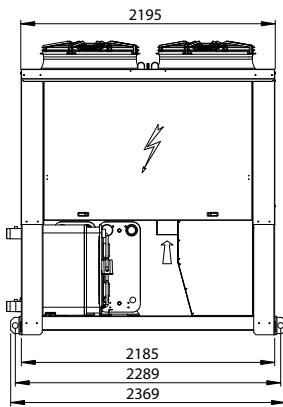
SLS-R 1602 ELN/HET



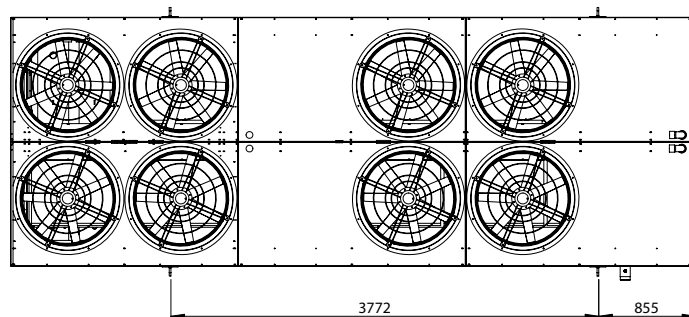
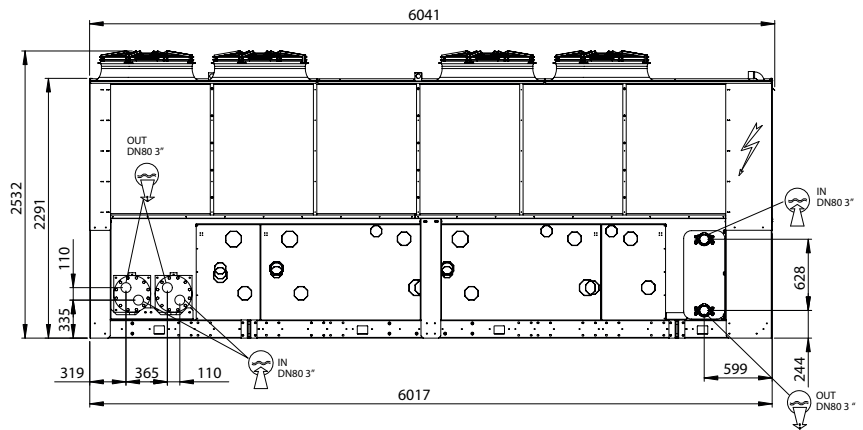
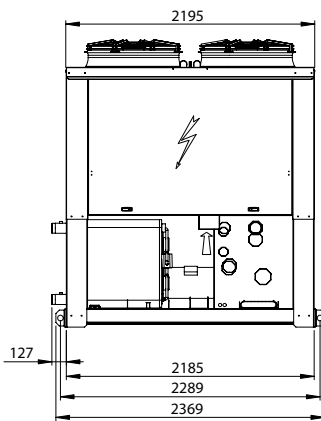
SLS-R 1802 ELN/HET - SLS-R 1802-1902-2002 BLN/LN



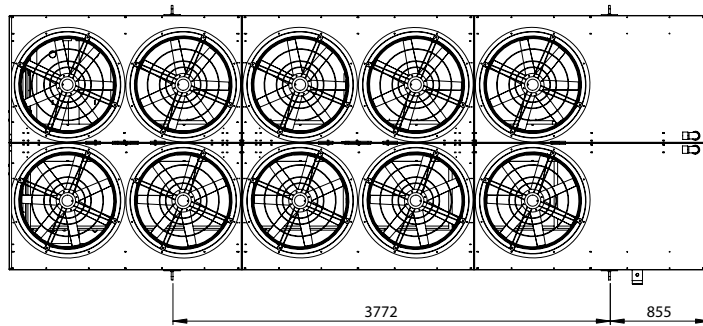
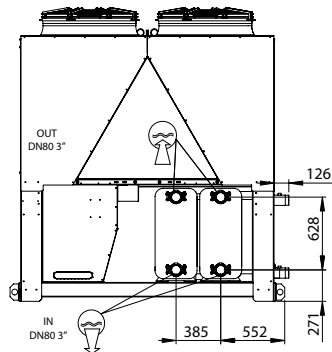
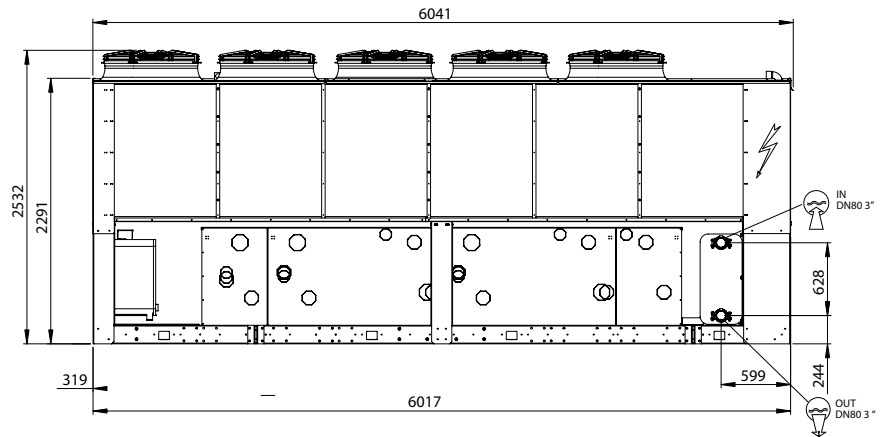
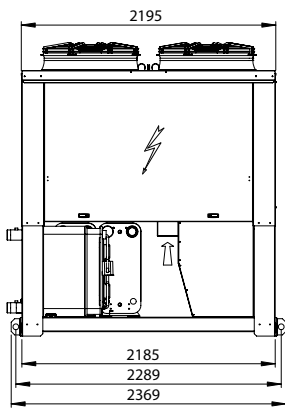
SLS-R 1902 ELN/HET



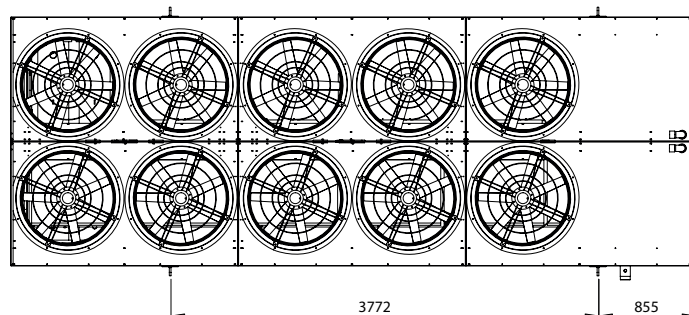
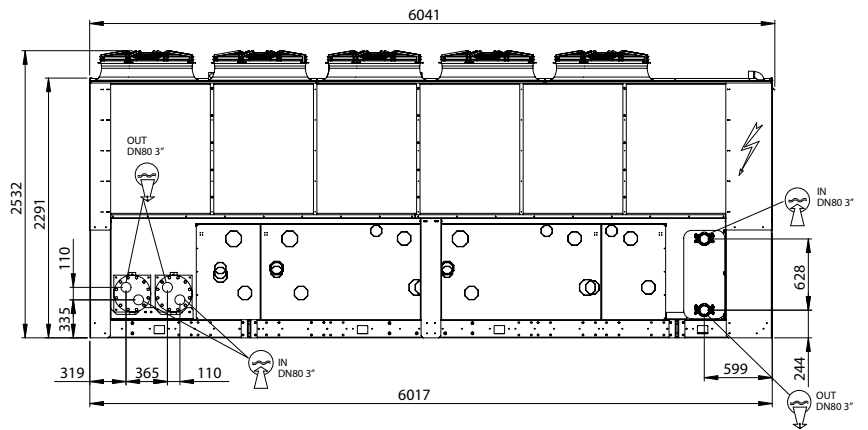
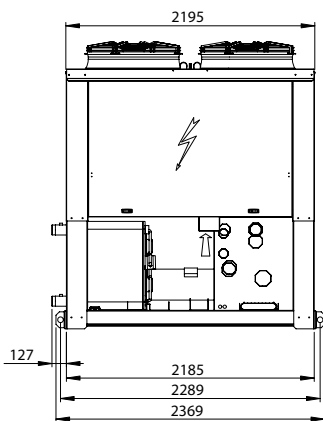
SLS-R 2202 ELN/HET - SLS-R 2202 -2402-2602 BLN/LN



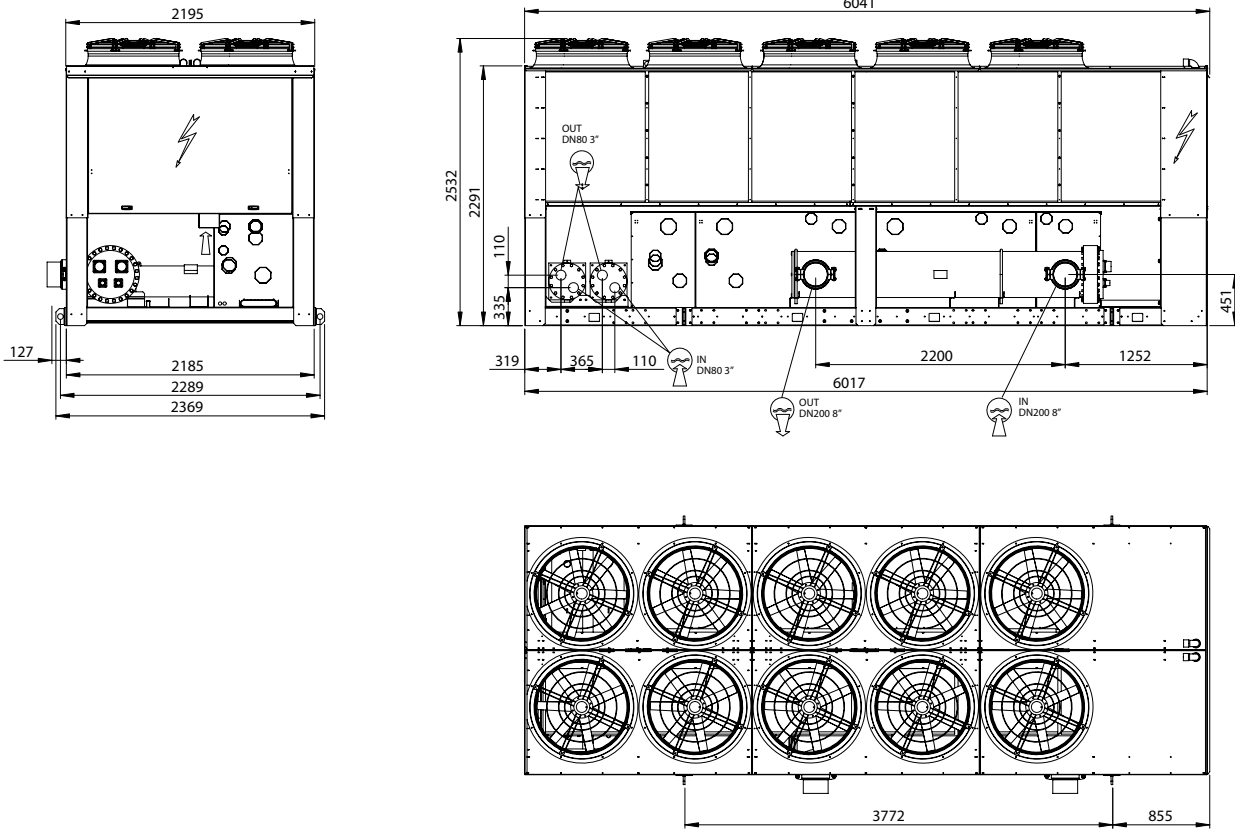
SLS-R 2002 ELN/HET



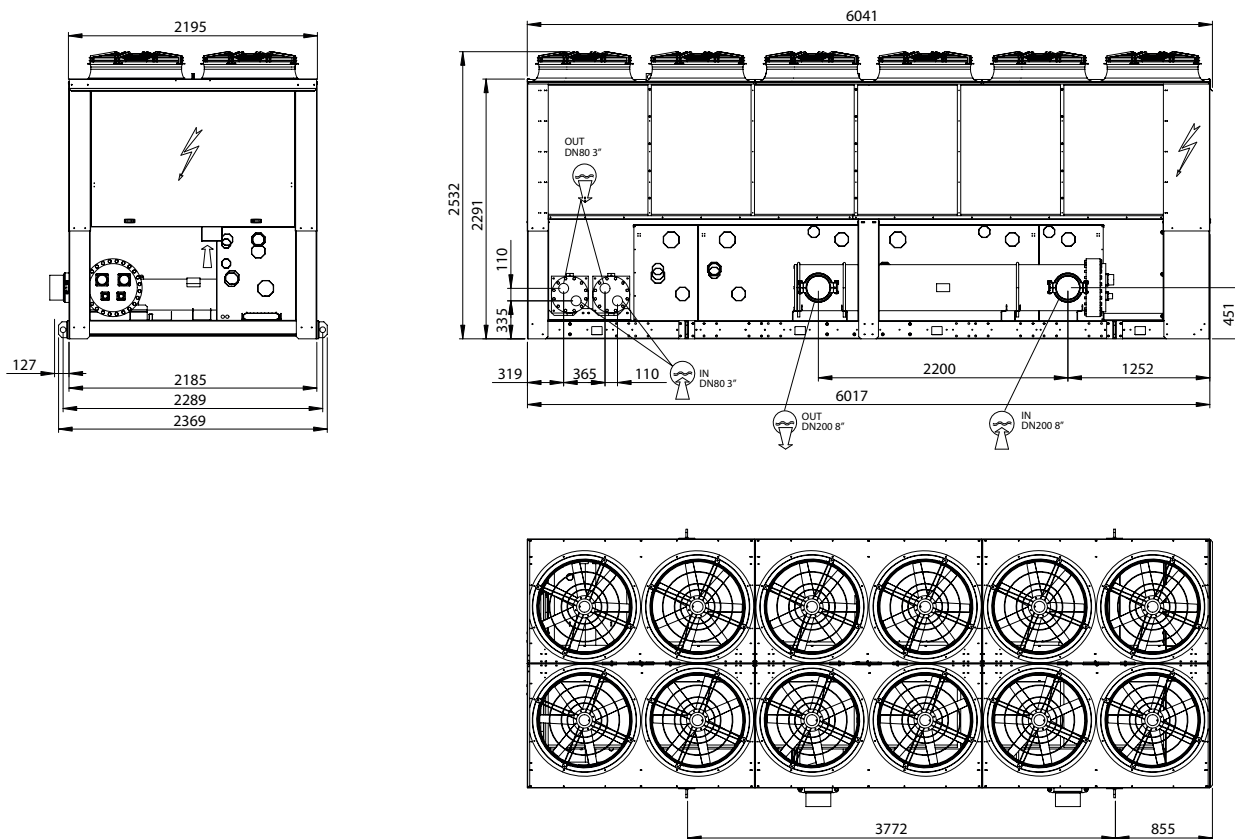
SLS-R 2402-2602 ELN/HET



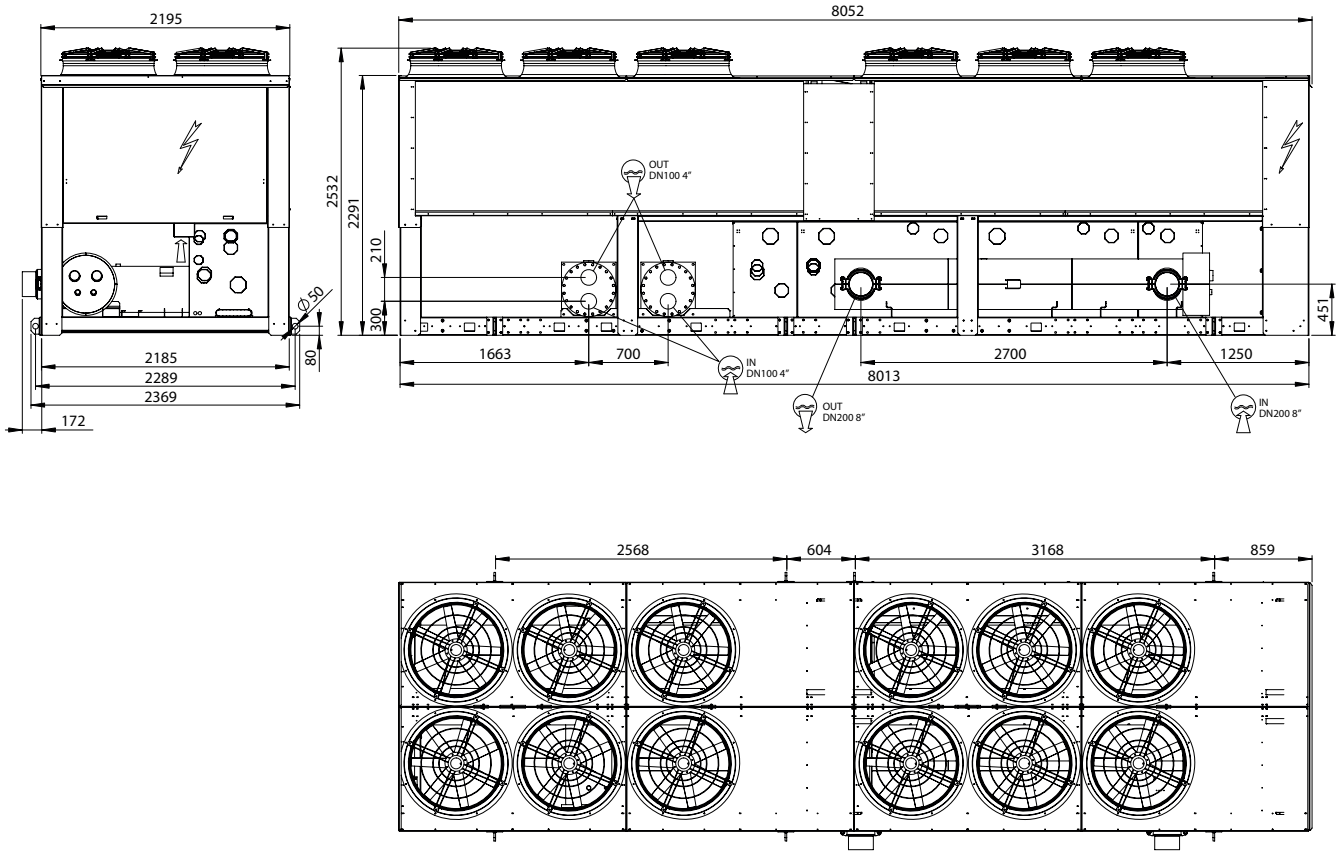
SLS-R 3002 BLN/LN



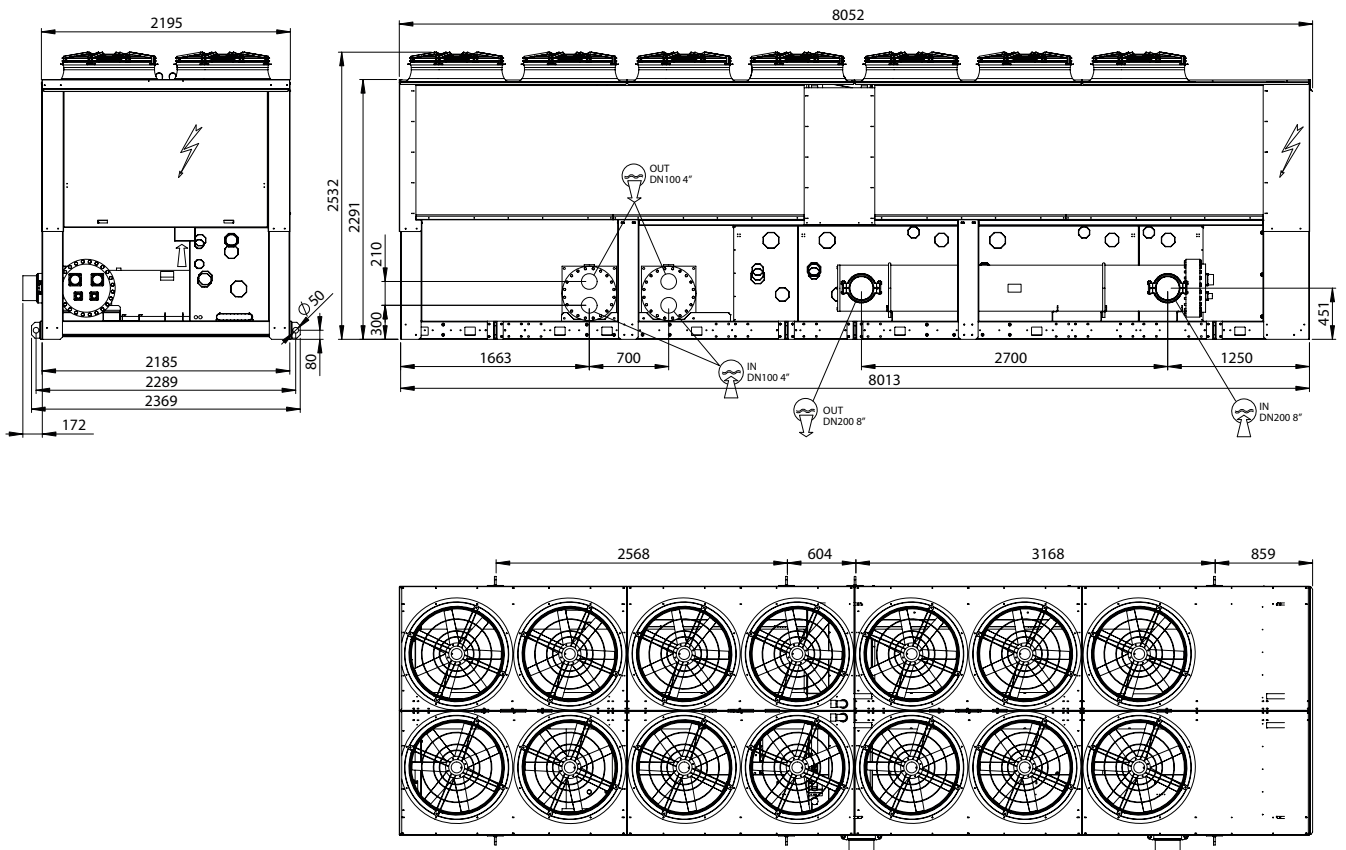
SLS-R 3002-3402 ELN/HET - SLS-R 3402 BLN/LN



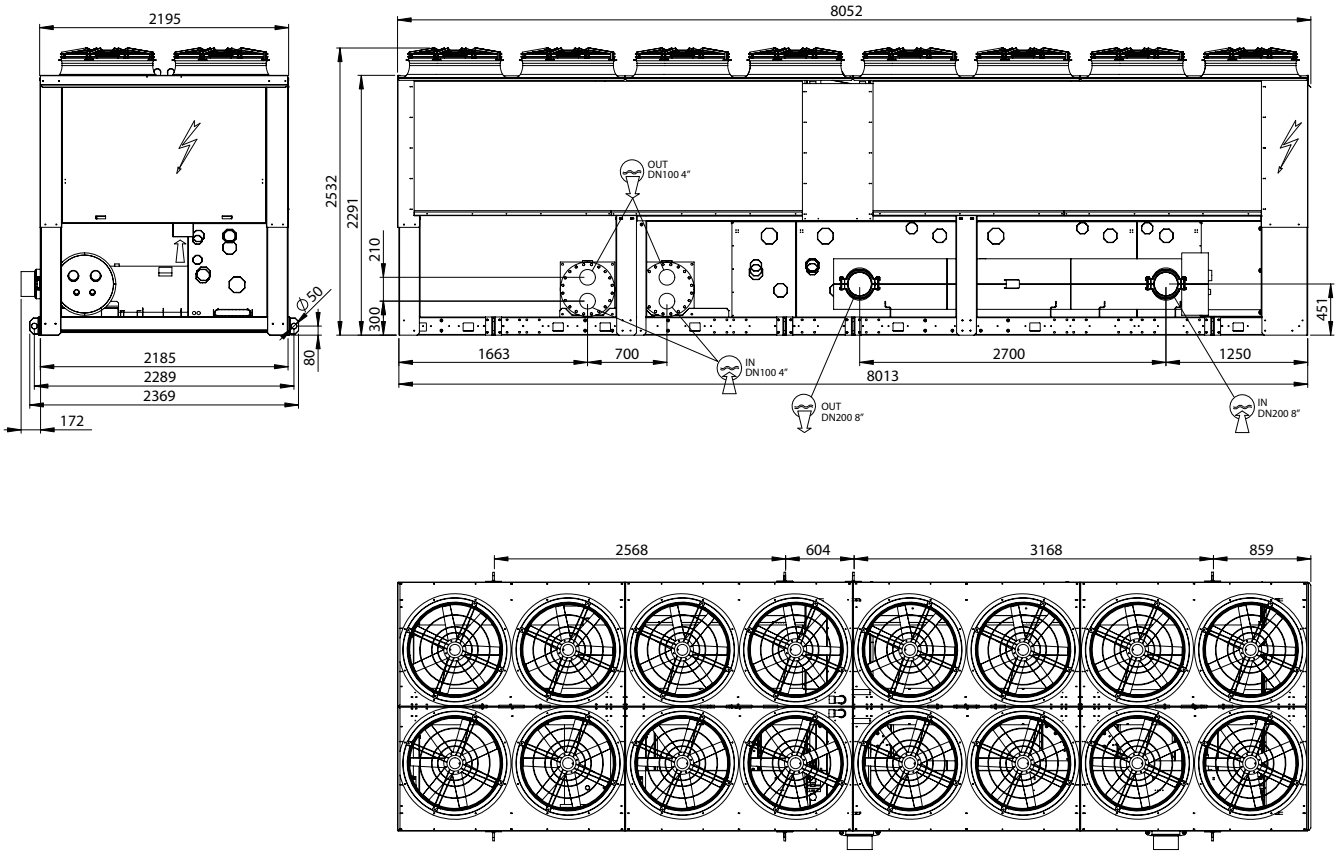
SLS-R 3802 BLN/LN



SLS-R 3802 ELN/HET - SLS-R 4202 BLN/LN



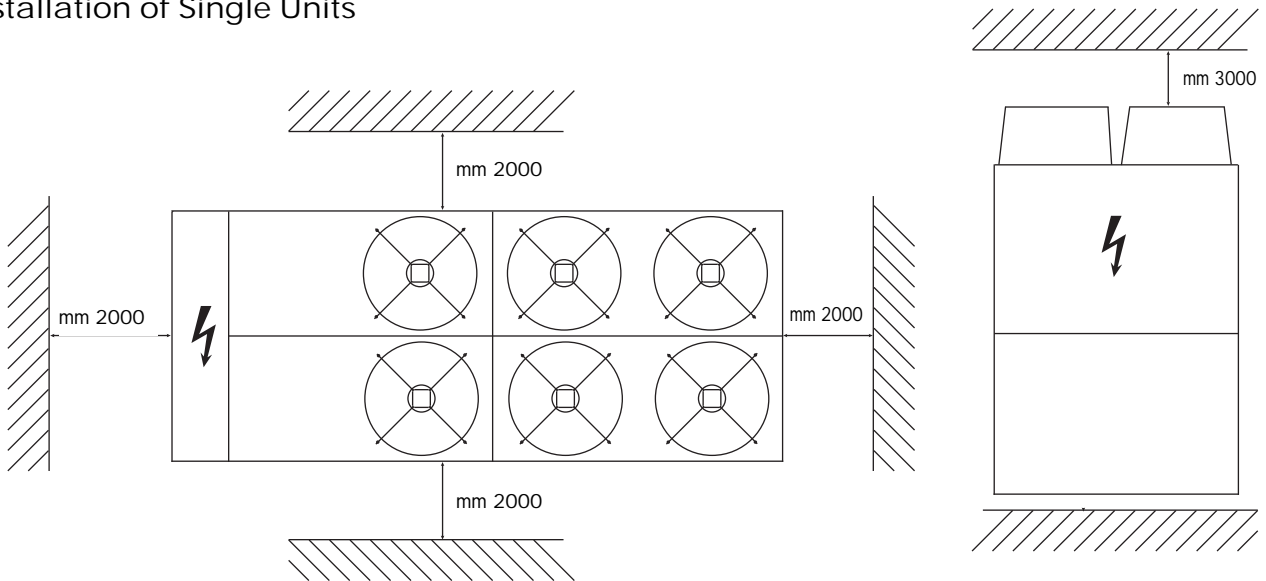
SLS-R 4202 ELN/HET



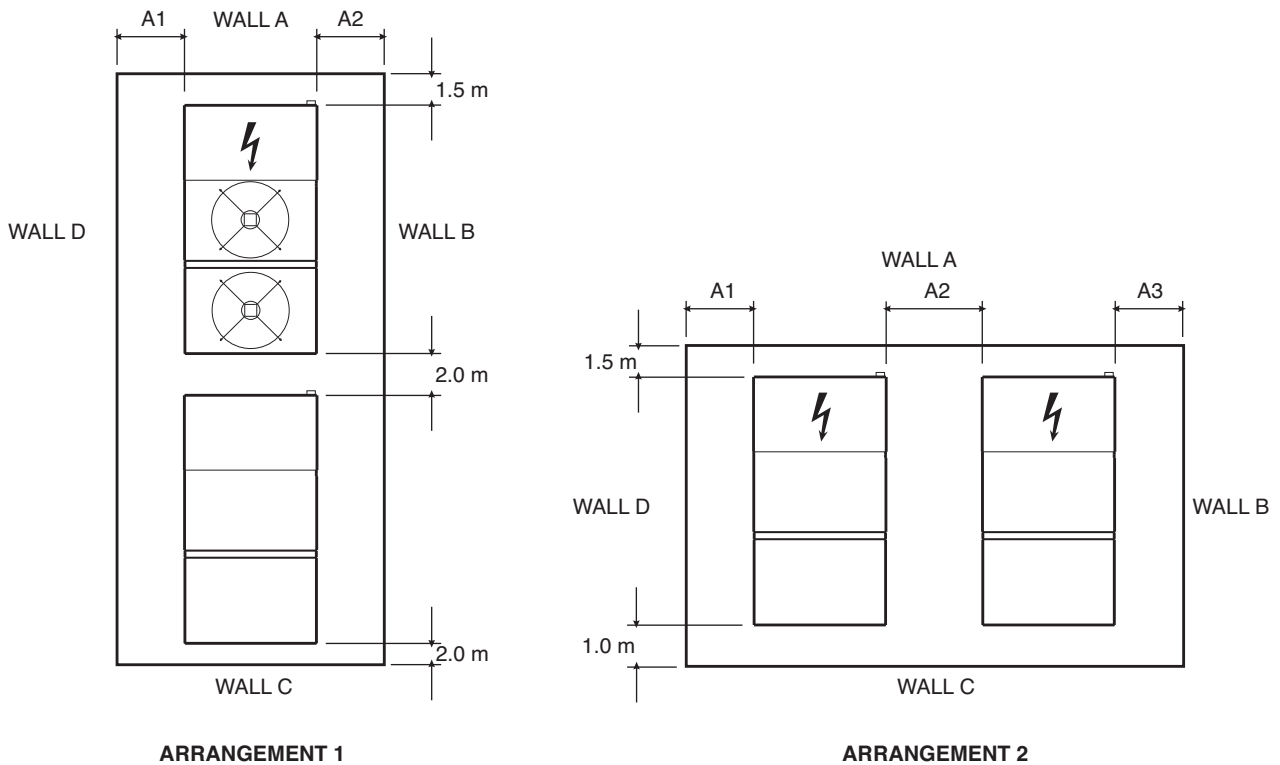
8.6 Service spaces

Units SLS/SLH All versions

Installation of Single Units



Installation of several Units



	A and C SCREENED B and D SOLID			A and B SOLID C and D SOLID			B and D SCREENED A and C SOLID			A and B SCREENED C and D SOLID			A and D SCREENED B and D SOLID		
	A1	A2	A3	A1	A2	A3	A1	A2	A3	A1	A2	A3	A1	A2	A3
Arrangement 1 (m)	2	2		2	2	1.5	1.5	1.5	1.5	1.0	2	1.5	1.5	2	
Arrangement 2 (m)	2	2	2	2	2	2	1.5	2	1.5	1.0	2	2	2	2	2

A wall only may be higher than the units.
The area between the walls must be kept free from any obstacle which may hinder the free air inflow towards the unit(s).

9 MAINTENANCE

Carefully read the "Safety" section of this manual before carrying out any maintenance operations.



Do not discharge the refrigerant into the atmosphere while the refrigeration circuits are being drained. Use appropriate recovery equipment.

When the recovered refrigerant cannot be re-used, return it to the manufacturer.



Do not throw away the waste oil of the compressor, because it contains refrigerant in solution.

The waste oil must be returned to the manufacturer.

Unless otherwise specified, the operations described below may be carried out only by a trained maintenance operator.

9.1 General requirements

Itelco-Industry units have been designed for continuous operation, providing that they are subjected to regular maintenance, within the limits specified in this manual. Each unit must be serviced according to the programme by the User/Customer, and must be inspected at regular intervals by the personnel of one of Itelco-Industry's authorised Service Centers.

It is the responsibility of the User to meet these maintenance requirements and/or to enter into an agreement with one of Itelco-Industry's Service Centers, so as to properly safeguard the operation of the appliance.

During the warranty period, in case of damage or failures caused by improper maintenance, Itelco-Industry will not refund the costs incurred to repair the appliance in its original state.

The provisions of this section apply only to standard units; according to the order requirements, other documentation may be added, concerning any modifications or supplementary accessories.

9.2 Planned maintenance

Maintenance inspections must be carried out according to the program below, by a qualified person.

As a general rule, units cannot be repaired directly by the user, who shall not try to service or repair any failures or anomalies identified during daily inspections. If you are in doubt, please contact Itelco-Industry Service Centre.

Scheduled Maintenance

Operations	Daily	Weekly	Monthly	Beginning of season	End of season
Check the temperature of the leaving fluid	•				
Check the pressure drops in the heat exchanger		•			
Check for electric absorption		•			
Check suction pressure and temperature		•			
Check delivery pressure and temperature		•			
Check the oil level in the compressor		•			
Check that there are no gas bubbles in the liquid line		•			
Check that the fins of the external coil are clean (if any)			•		
Check the operation of the oil heaters			•		
Check the remote control switches			•		
Check the operation of the LP pressure switch				•	
Check the operation of the HP pressure switch				•	
Check the insulation of the heat exchanger				•	
Check that terminals are tightened				•	
Check that the terminals' screws are tightened				•	
Clean the exterior of the unit with water and soap				•	
Check the density of the antifreeze (if any)				•	•
Check the operation of the flow switches				•	
Check the operation of the solenoid valve				•	•

9.3 Refrigerant charge



Do not inject refrigerant liquid into the LP side of the circuit. Be very careful, and charge the circuit properly. If the charge is insufficient, the efficiency of the unit will be lower than expected. In the worst of cases the LP pressure switch may be activated, resulting in the halting of the unit.

In the presence of an excess charge, the condensing pressure will rise (in the worst of cases, the HP pressure switch may be activated, resulting in the stop of the equipment), and the consumption will increase as well.



It is strictly forbidden to use the compressor as a vacuum pump to drain the plant.

Fill the refrigeration circuit after it has been drained for maintenance purposes (leaks, replacement of the compressor etc.). The amount of the charge is indicated on the plate affixed to the unit.

Before refilling, it is important to drain and de-hydrate the circuit, thus obtaining a minimum abs. pressure value of 50 Pa.

Inject the refrigerant fluid before removing the vacuum, then fill the circuit up to 90% of the total gas requirement (in liquid form). The appliance must be filled through the filling valve on the liquid line, on the outlet side of the condenser.

It is recommended to connect the refrigerant cylinder to the filling valve on the liquid line, and to arrange it in such a way as to inject only liquid refrigerant.

Then start the compressor and let the gas flow from the cylinder, up until the liquid flow, which can be observed through the sight glass, is limpid.

9.4 Compressor

The frequency of the checks to be made on compressors depends on a variety of factors, first of all the working conditions. Anyway, it is advisable to adopt the following tips:

- After 300 hours of work, check the conditions of the oil: a certain amount of impurities from the system may accumulate in the oil of the compressors.
- Check the acidity of the oil every year.

- After 8000 hours of work, carry out a visual inspection on the suction/discharge valves for wear. If necessary, replace these components. If compressors are started/stopped frequently or in particularly demanding working conditions, it is advisable to reduce this period to 5000 hours. Anyway, this time is indicative only.
- After 24000 hours of work, carry out a general overhaul of the compressor. If the compressors work for a period shorter than 40% of a year, the overhaul can be performed every about 5 years. This period depends on the type of application, the working conditions, the duration of start/stop cycles.



If it is necessary to replace the compressor (in case of burning of the winding or mechanical failure), contact one of Itelco-Industry's Service Centres.

The compressors use polyester oil. During maintenance operations on the compressor, or if it opens in any point of the refrigerant circuit, do not forget that this type of oil is highly hygroscopic, and accordingly do not leave it exposed to the atmosphere, as this would require the replacement of the oil.

9.5 Condenser's coils

The condenser's coils consist of copper pipes and aluminium fins. In the presence of leaks caused by any damage or shock, the coils shall be repaired or replaced by one of Itelco-Industry's authorised Service Centers. To ensure the effective and correct operation of the condenser coils, it is important to keep the condenser's surface perfectly clean, and to check that there is no foreign matter, such as leaves, wires, insects, waste etc. If the coil becomes dirty, there is an increase in the absorption of electric energy. Furthermore, the maximum pressure alarm may be activated and may halt the unit.



Be careful not to damage the aluminium fins during cleaning.

The condenser must be cleaned with a LP compressed air jet, parallel to the aluminium fins, in the direction opposite to the air circulation.

To clean the coil you can use also a vacuum cleaner, or a jet of water and soap.

9.6 Fans

The fans of the condenser, of axial type, are complete with impeller with aerodynamic profile blades and a cylindrical nozzle. The motor's bearings are lubricated forever.

Before starting the appliance, after any maintenance operations involving the disconnection of 3-phase connections, check that the direction of rotation of the fans is the one indicated by the arrow (upward air current). If the direction of rotation is wrong, invert two of the three supply phases to the motor.

9.7 Dehydrating filter

The refrigeration circuits are provided with dehydrating filters.

The filter clogging is marked by the presence of air bubbles in the sight glass, or by the difference between the temperatures measured downstream from and upstream of the drying filter. If, once the cartridge has been cleaned, there are still some air bubbles, the appliance has lost a part of the refrigerant charge in one or more points, that must be identified and serviced.

9.8 Sight glass

The sight glass is used for inspecting the refrigerant flow and the humidity % of the refrigerant. The presence of bubbles indicates that the dehydrating filter is clogged or the charge insufficient.

A colour indicator is positioned inside the sight glass. If you compare the colour of the indicator to the scale on the ring of the sight glass, you can calculate the percentage of humidity of the refrigerant. If it is excessive, replace the filter's cartridge, operate the appliance for 1 day and then check the humidity % again. When the humidity % is within the pre-determined range, no other operations are required. If the humidity % is still too high, replace the dehydrating filter again, start the unit and operate it for another day.

9.9 Thermostatic expansion valve

The circuit of the unit is equipped with a thermostatic expansion valve, with external equalizer

The valve is shop-calibrated for an overheating of 5°C.

Procedure to check for overheating:

- Measure the suction pressure with the pressure gauges on the board of the unit or using a pressure gauge connected to the service valve on the suction side.
- From the pressure gauge's temperature scale, measure the saturated suction temperature (T_{sa}) which corresponds to the pressure value.

- Using a contact pressure gauge affixed to the outlet fitting of the gas of the evaporator, measure the actual temperature (T_{se}).

Overheating calculation (S):

$$S = T_{se} - T_{sa}$$

Overheating is regulated through the thermostatic expansion valve.

Make the adjusting screw follow a complete turn, and operate the appliance for five minutes. Check again and, if necessary, repeat the regulation.

If the expansion valve cannot be regulated, it is probably broken, and shall be replaced. The replacement must be carried out by a Service Centre.

9.10 Evaporator

Check at regular intervals that the water side of the heat exchanger is perfectly clean. To do this, measure the pressure drop, water side (see Section 8) or measure the temperature of the liquid leaving and entering the heat exchanger, and compare it to the evaporation temperature.

To obtain an effective heat exchange, the difference between the temperature of the leaving water and the saturated evaporating temperature must be in the 5 - 7°C range. A greater difference would indicate a low efficiency of the heat exchanger (i.e. the heat exchanger is dirty).

In this case, the heat exchanger must be subjected to chemical cleaning, an operation that shall be carried out by authorised engineers.

For other maintenance operations (extraordinary overhauling, replacement of the heat exchanger etc.), contact an authorised Service Centre.

9.11 Desuperheater and total heat recovery condenser

Check at regular intervals that the water side of the heat exchanger is perfectly clean. To do this, measure the pressure drop, water side (see Section 8) or measure the temperature of the liquid leaving and entering the exchanger.

To obtain an effective heat exchange check the following:

- Desuperheater: the difference between the temperature of the entering and the leaving water must be about 5°.
- Total heat recovery condensers: the difference between the temperature of the leaving water and the saturated condensing temperature must be about 10°.

10 TROUBLESHOOTING

The table below lists the anomalies of operation of the unit, the relevant causes and the corrective measures. For anomalies of any other type or not listed, contact one of Itelco-Industry's Service Centre for technical assistance.

Anomaly	Cause	Operation
The unit continues to work, but without cooling.	Insufficient charge of refrigerant.	Refill.
	The dehydrating filter is clogged.	Replace.
Ice on the suction line.	Wrong calibration of overheating.	Increase overheating.
		Check the charge.
Excessive noise.	Vibration of lines.	Check the clamping brackets, if any.
	Whistler emitted by the thermostatic expansion valve.	Refill.
		Check the dehydrating filter.
Noisy compressor.		Seized bearings; replace the compressor.
		Check that the compressor's locknuts are tightened.
Low oil level in the compressor.	One or more gas or oil leaks in the circuit.	Identify and remove leaks.
	Mechanical failure of the compressor.	Request the intervention of a Service Centre.
	Anomaly of the oil heater of the compressor's base.	Check the electric circuit and the resistor of the heater of the motor base, and replace defective components.

Anomaly	Cause	Operation
One or both compressors are not working.	Breaking of the electric circuit.	Check the electric circuit and detect any ground dispersions and short circuits. Check fuses.
	Intervention of the HP pressure switch.	Reset the pressure switch and the control panel and restart the appliance. Identify and remove the cause that enabled the pressure switch.
	The fuse of the control circuit is broken.	Check for ground dispersions and short circuits. Replace fuses.
	Loosened terminals.	Check and tighten.
	Halt caused by thermal overload of the electric circuit.	Check the operation of check and safety devices. Identify and remove the cause.
	Wrong wiring.	Check wiring of check and safety devices.
	The line voltage is too low.	Check voltage. If problems regard the system, solve them. If they are caused by the distribution network, inform the Energy Distributor.
	Short-circuit of the compressor's motor.	Check the continuity of the winding.
	Seized compressor.	Replace the compressor.
Activation of the LP alarm, stop of the unit.	Gas leak.	Identify and remove the leak.
	Insufficient charge.	Refill.
	Failure of the pressure switch.	Replace the pressure switch.
Activation of the HP alarm, stop of the unit.	Failure of the pressure switch.	Check the operation of the pressure switch, replace it if defective.
	The delivery valve is partially closed.	Open the valve and replace it, if faulty.
	Substances with condensable gases in the circuit.	Drain the circuit.
	The fan (i) of the condenser is stopped.	Check cables and motor. If defective, repair or replace.
The liquid line is too hot.	Insufficient charge.	Identify and remove the cause of the loss of charge and refill.
Frosting of the liquid line.	The valve of the liquid line is partially closed.	Check that valves are open.
	The liquid filter is clogged.	Replace the cartridge or the filter.

11 SPARE PARTS

11.1 Spare part list

The table below shows the list of spare parts recommended during the first two years of operation.

Component	Number
HP pressure switch	1
Gas filter	2
Thermostatic valve	2
Auxiliary relays	2
Fan's fuses	6
Compressor's fuses	6
Auxiliary fuses	6
Set of compressor contactors	1
Fan's contactor	1
Water sensor	1
Air sensor	1
HP pressure transducer	1
LP pressure transducer	1
Electronic card	1
Keyboard	1
Compressor oil resistor	1

11.2 Oil for compressors

The compressors are lubricated with:

Compressor	Refrigerant	Lubricant oil
REFCOMP	R134a, R407C	DEA SE 170
	R22	CPI CP- 4214-320
BITZER	R134a, R407C	BITZER BSE 170
	R22	BITZER B320SH

11.3 Wiring diagrams

The wiring diagrams are installed inside the doors of the electrical panels of the unit.
Any request for wiring diagrams shall be forwarded to Itelco-Industry Service Centre.

12 DISMANTLING, DEMOLITION AND SCRAPPING



During the draining of the refrigeration circuits, do not let the refrigerant overflow in the surrounding atmosphere.

The circuit must be drained using suitable recovery equipment.



Do not disperse the waste oil of the compressors in the environment, since it contains some dissolved refrigerant.

For the disposal, contact the competent authority for information.

Unless otherwise specified, the maintenance operations listed below may be carried out by any trained maintenance operator.

12.1 Generalities

Open each line that supplies the unit, including the ones of control circuits. Make sure that all disconnecting switches are secured in the off position. The power cables can be disconnected and disassembled. Refer to Chapter 4 for the position of connection points.

Remove all the refrigerant from the refrigeration circuits of the unit and store it in suitable containers, using a recovery unit. If its characteristics have remained the same, the refrigerant can be used again. Contact the competent authority to obtain information about disposal. In NO event shall the refrigerant be discharged into the atmosphere. The oil in each refrigeration circuit must be drained and collected into a suitable container; then it shall be disposed of in conformity with local regulations that apply to the disposal of waste lubricants. Any oil spillage must be recovered and disposed of in like manner.

Isolate the unit's heat exchangers from the external hydraulic circuits and drain the heat exchange sections of the plant. If no isolation valves are installed on the cooler it might be necessary to drain the complete hydronic system.



If no shutoff valves have been provided, it may be necessary to drain the whole plant.

If a glycoled solution or a similar fluid has been used in the hydraulic circuits, or if chemical additives have been added to the circulating water, the circulating fluid **MUST** be drained in a proper way.

For NO reason shall a circuit containing glycoled water or a similar solution be discharged directly into the drains or surface waters.

After draining operations, the piping of the hydraulic networks can be disconnected and disassembled.

Once they have been disconnected as specified, the packaged units can be disassembled in a single piece. First of all, disassemble the anchoring screws and then lift the unit from the position of installation, and hook it to the lifting points provided, using suitable lifting equipment.

To this end, refer to Chapter 4 for the installation of these appliances, to Chapter 8 for their weights and Chapter 3 for handling.

The units that, once disconnected, cannot be removed in a single piece, must be dismantled on site; in this case, be very careful with the weight and handling of every single component.

It is always advisable to dismantle the units following the installation steps, but in reverse.



Some residues of oil, glycoled water or similar solutions may remain in certain parts of the unit. These residues must be recovered and disposed of according to the procedures specified above.

It is very important to ensure that, while a component of the unit is being removed, all the others are properly supported.



Use only lifting means of adequate capacity.

Once disassembled, the components of the unit can be disposed of in conformity with current regulations.

As part of our ongoing product improvement programme, our products are subject to change without prior notice. Non contractual photos.

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